LETTERS AND PAPERS

O N

Agriculture, Planting, &c.

ADDRESSED TO THE

Bath and Weſt of England Society,

FOR THE ENCOURAGEMENT OF

Agriculture, Arts, Manufactures, and Commerce.

VOLUME VI.

LETTERS AND PAPERS

ON

Agriculture, Planting, &c.

SELECTED FROM

THE CORRESPONDENCE

OF THE

Bath and Weſt of England Society

FOR THE ENCOURAGEMENT OF

AGRICULTURE,	MANUFACTURES,
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VOL. VI.

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INTRODUCTION.

THE uſual period of two years having elapſed, this volume was ſent to the preſs, and would have been ſooner publiſhed, but unforeſeen impediments prevented. Since the publication of the fifth volume, the Society has been attentive to the various ſubjects of publick utility included in its plan.

It will naturally be ſuppoſed that a Society which has now exiſted fifteen years, ſhould frequently take a retroſpective view of the ſtate of agriculture, before and ſince the period of its eſtabliſhment; and that this great ſubject ſhould be contemplated in connexion with the growing ſtate of the trade, manufactures, and population of the kingdom:—a population which is generally believed to be rapidly increaſing, and which, if ſo, may fairly be conſidered as a natural conſequence of a flouriſhing trade, and moſt extenſive commerce. In theſe reſpects this empire may be brought into an enviable compariſon with the moſt powerful countries of Europe: and in proportion to its importance, in theſe points of view, may be conſidered, under Providence, its internal ſtrength, its ſecurity, and its capacity for happineſs.

While ſuch conſiderations animate the breaſts of an induſtrious, benevolent, and brave people, thoſe among them who are poſſeſſed of ability, and actuated by benevolence, cannot but feel an increaſing ſolicitude, that agriculture and planting may continue to be aided with all the energy that their augmented importance demands. That the benefits of agriculture, and indeed the abſolute neceſſity of its improvement, are felt more powerfully than ever, is a truth which no other argument than the increaſing demand for the neceſſaries of life, is required to confirm. The landed gentlemen, and thoſe daily enriched by commerce, are now emulous in the ſtudy of agriculture; the improvement of poor, waſte and barren lands, is become a favourite undertaking; and a laudable enquiry ſeems to be general, *How the face of the country, according to its local circumſtances, can be rendered moſt productive?* This general enquiry, and the conſequent exertions, may in no ſmall degree be imputed to the publick-ſpirited inſtitutions in the kingdom, among which THE BATH AND WEST OF ENGLAND SOCIETY has the honour of holding no inconſiderable place. The effect of ſuch eſtabliſhments, though gradual and diffuſed, has undoubtedly been ſure and happy. For under all the circumſtances of increaſed demand, it is an obvious truth that the ſupply of every neceſſary, and moſt of the comforts, of life, is not only abundant, but in general eaſy of acquiſition to the honeſt and induſtrious of all deſcriptions. This augmented ſupply has been furniſhed, in ſome degree, by the increaſe of lands brought into cultivation; but perhaps far more by improvements in the general ſyſtem.

Great, of late years, have thoſe improvements been in the progreſſive extinction of ſummer fallows, by means of ameliorating, and at the ſame time profitable, feeding crops. That it has been an age of ſpeculative, as well as practical, experiment, will be allowed; and the confeſſion may be made without regret. For though individuals may have frequently failed in different projects, the contrary muſt never be expected in firſt experiments. It is not in human wiſdom to deviſe at once the means of reaping from all-bountiful nature the fulleſt produce of her powers. In the preſent ſtage of experimental diſcovery, ſundry profitable facts have been aſcertained, reſpecting the relative value of crops, and articles of food for live ſtock.

Of the publick importance of Mangel-Wurzel, but little expectation is now formed; and while turnip crops, in various ſituations, will continue to maintain their importance, it ſeems, from confirmed experience, that large cabbages, carrots, parſnips, turnip-rooted cabbage, ruta-baga, and potatoes, will be found of increaſing conſequence to the nation.

Of theſe the ruta-baga, or Swediſh turnip, ſeems at preſent to be leaſt generally known, tho' with an undoubted proſpect of ſoon becoming not only *well* known, but very highly eſteemed for its productive growth, its nutrition, and its hardineſs. The ſeed has hitherto been dear, but may ſoon be expected much cheaper. And it will be patriotick in gentlemen, and farmers in general, to ſave as much as they conveniently can for ſale the next ſeaſon.

Of the potatoe, that common but invaluable root, much remains to be conſidered and proved. Its value to the poor of this country was largely anticipated, by that late eminent and worthy man Dr. JOHN FOTHERGILL; he cauſed large plantations to be made near London, with a view of aſcertaining, and rendering more conſpicuous, the vaſt importance of this formerly humble article. It was not then, or till of late years, ſuppoſed by practical farmers in general, that it would ſoon become an article of immenſe conſequence in field culture, both with a view to preparing the earth for a fine wheat crop, and as a moſt abundant ſupply of food for the live ſtock of a farm. In theſe different points of view, the papers heretofore publiſhed on the ſubject, in theſe volumes, may have ſerved to excite a profitable attention; but the maſterly experimental memoir, contained in the preſent volume, from a gentleman to whoſe exertions and publick ſpirit his country is largely indebted, will give peculiar ſatisfaction. From the clear manner in which he has detailed his experiments, and the large ſcale on which they were made, much may be known and inferred, concerning the uſes and advantages of this very important root; and it is not without a hope of national advantage, that the paper in queſtion is recommended to particular attention.

The ſame gentleman is now voluntarily conducting an experiment, by feeding ſix ſorts of ſheep through the current year, in ſuch a manner as to aſcertain, as far as ſuch an experiment may do it, the diſputed point, *which is the beſt race of ſheep for general ſtock,* *with regard both to the wool and carcaſe?* This ſubject will continue to employ the attention of the Society 'till ſome determinate facts are aſcertained, that may lead to publick conviction. How far the *general improvement of the quality of Britiſh wool* is practicable, ſo as to ſuperſede the neceſſity of a large foreign ſupply, is a queſtion agitating elſewhere; and this Society cannot be inattentive to its ſolution. It might poſſibly be found that a general national alteration of the ſtock of ſheep, in favour of fine wool, would be incompatible with the national intereſt, both with reſpect to the *quantity* of wool and of mutton. Whether the quantity, and conſequently the cheapneſs of mutton, would not be in danger of being ſacrificed to fineneſs of wool; or whether the coarſeneſs of moſt of our wool, compared with Spaniſh, be, under all circumſtances, an evil; are queſtions of no ſmall moment. Some gentlemen, of much candour and reflection, will not be diſappointed if this Society ſhould ultimately fix in a confirmed opinion, that there is no race of ſheep in Britain but what has its advantages,

tages, for particular ſituations and expoſures. We have no wool, however coarſe, but what is uſeful. Our different manufactures for home and foreign trade, require the different ſorts already known, conſume them all, and even call for more. If it ſhould be found that the preſent ſyſtem of artificial feeding, neceſſary to increaſe the quantity of mutton, (and which conſequently increaſes wool) is incompatible with a general improvement in the *fineneſs* of wool, ſtill that increaſed quantity of human food, a proportionable increaſe of wool and manure, and the adaptation of ſheep to the circumſtances of the diſtrict, are objects of higher national importance, than a uniform fineneſs of wool. Theſe points may now be conſidered as in a fairer train for inveſtigation than heretofore: and the reſult may be expected at a future day. So long as Britiſh genius and advantages for manufacture, on a compariſon with thoſe of other European nations, continue what they are, ſo long muſt wool of ſome ſort be imported. And the queſtion then will moſt probably be, *which* may be imported to greateſt advantage, that which is *moſt*, or that which is *leaſt* compatible with the firſt of all objects, an improving agriculture? If the *latter* of the two, then it may be deemed a happy circumſtance, that that ſort is to be imported, which, from its compactneſs, lies in leaſt room; and which may be paid for, in part at leaſt, by the lighter and coarſer manufactured articles made from the combing wool of our own country.

Reſpecting the volumes now before the publick, it has been ſuggeſted by one or more of the Society, that a General Index of the various topics might be found uſeful. It therefore may become the care of the proper Committee to have ſuch an index furniſhed in the next volume, if ſuch ſhall be deemed particularly neceſſary.

It now remains to invite gentlemen who are in the habit of agricultural experiment, to communicate whatever facts they may aſcertain, that are either new in themſelves, or which they may deem of a uſeful tendency in the advancement of knowledge. Such favours will be ever thankfully received. And it is preſumed that a candour of attention, and a conſtant regard to the publick intereſt, will continue to be exerciſed by the Committees of this Society.”

Bath, July 10, 1792.

LETTERS

LETTER

TO THE

BATH AND WEST OF ENGLAND AGRICULTURE SOCIETY.

ARTICLE I.

A Series of Letters on Planting, and the Management of Woods, from THOMAS SOUTH, *Eſq; to the Secretary.*

LETTER I.

SIR,

THE memoirs you obligingly ſent hither gratified me exceedingly; they contain an ample fund of Agricultural Experiments; but that grand national object, *the growth of timber*, has hitherto been ſparingly treated of. It may not be generally known, that the deſtruction of Oak, towards the middle of the preſent century, became ſo very rapid, as to occaſion public enquiry in 1771, the returns* to which aſcertained, *that the*

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* Vide theſe Returns in the Commiſſioners 3d Report, p. 72.

naval Timber had decreaſed in quantity within forty or fifty years, then paſt, to the amazing amount of four-fifths on an average through the kingdom. What an alarming circumſtance, to a maritime ſtate like this! And the misfortune is, that ſuch devaſtation ſtill continues, both in publick and in private woods. To demonſtrate what a heavy loſs is ſuſtained by the community, through the imprudence of private owners, I ſtate the following facts.

The year before laſt, there were fourſcore Oaks felled in this neighbourhood, *whoſe aggregate contents ſcarcely exceeded twenty tons*; and in 1758, a ſingle tree was felled, but a very few miles from the ſpot, *which contained in itſelf twenty-eight tons.* The ſoil where theſe diminutive ſticks were produced, was of a nature equally propitious to the growth of oak, as that of Langley-Wood, and moſt of them had room to ſpread in; conſequently ſuch, had they been permitted to remain, would have become Naval Timber. Let what encouragement ſoever be given to promote private plantations, they muſt be long in repairing ſuch loſſes as theſe. Our modern planters, I fear, purſue the ornamental, more than the uſeful plan. Oaks, being tardy growers, are ſeldom propagated; the ſilver, ſpruce, Scotch firs, and other free-growing trees, are preferred. One ingenious correſpondent* of yours cut down his firs, indeed, for the ſake of his oaks; and another for the ſake of his beeches.† The planters of oaks and beeches deſerve every encouragement, as both find place in Naval Architecture; the latter, if long and ſtrait, ſerve to plank the bottoms of ſhips, up to the light water line, equally well with the former, and at leſs than half the expence. The moſt ſucceſsful planter I ever heard of, is your correſpondent Mr. Marſham. It does not often happen, that men have a taſte for ſuch purſuits, at the early age when he began his career; and in the courſe of things, it as ſeldom happens, that men attain his patriarchal years. To plant in 1720, and contemplate his improvements in 1790, is an inſtance ſcarce to be equalled. May his patriotic endeavours long be crowned with the bleſſings they deſerve! From the publick much is expected. Incloſures of foreſt land, if conducted with propriety, may prevent national ruin; for timber is become ſcarce on the continent as well as here; the increaſe of commerce cauſes ſuch a demand, that it riſes in value every where. The ſcarcity of knees* and crooks of large dimenſions is now ſeverely felt; it is with difficulty the docks get ſuppled, ſo that ſhips are often at a ſtand for want of them; the king's foreſts have been productive of many of theſe moſt valuable articles, but they are nearly exhauſted; and the methods propoſed by the ſurveyors for raiſing timber in Dean Foreſt, is by no means likely to remedy the defect. Planters ſhould not only conſider what ſuits their reſpective ſoils, but to what uſes their timber may be appropriated. The elm ought to be led up tall and ſtrait for keel-pieces, ſhip's pumps, water-pipes, &c. Arbele, if brought to great length and ſubſtance, will make good beams and rafters for barns, cottages, &c.; for this timber, (not being ſubject to the worm) whilſt under thatch that admits no wet, will continue ſound above a century. The perfection of aſh lies in its being free and tough, properties ſought after by coopers, wheelwrights, and coach-makers. Beech, as a quick grower, repays the planter's toil; it thrives well on chalky hills, and may be trained either to long boles for ſhip-planking, or to branchy crooks for mill-wheels; it is excellent in water-works of all kinds, for, where conſtantly kept wet, it is as durable as oak itſelf; and the preſent ſcarcity of that moſt valuable timber, requires that we ſhould employ every ſubſtitute we can in its place. The growers of oak ſhould be moſt particularly attentive to the ſituation and demand. In inland countries, where carriage is a drawback, and prevents a profitable communication with the ſea, timber, if thinned in due ſeaſon, cannot be drawn up too faſt. The houſe-carpenter, in ſituations like this, is the chief purchaſer, and ſtrait lengths are his delight. In the maritime counties, a large crook in the bole of a tree doubles its value, and admits it into a dock-yard, when but two-thirds the contents of a ſtrait one. Floor timbers, compaſs-pieces, knees, &c. are the baſis of naval architecture, and cannot be diſpenſed with; ſuch, when choice and large, carry in much inferior timber with them; and without a due proportion of ſuch, no contract is ever made by the Navy-board, nor can the merchant expect payment for what he has delivered, till the moſt uſeful of theſe articles

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* I think this mode of planting oaks a very good one, as likewiſe this gentleman's method of rendering crooked ſaplings ſtrait. Though I profeſs myſelf an advocate for rendering ſtrait ones crooked.

† I ſee no neceſſity for cutting down all the firs in this caſe, for the beech would have kept pace with them and flouriſhed, and there cannot be a more ornamental wood than a mixture of firs and beeches, eſpecially on a declivity, the contraſts between the deep green of the one, and the paler hue of the other, form a pleaſing object in the ſummer months. The golden tinge of the latter enriches the ſcene in autumn, and even when bronzed in the winter, they have no unpleaſing effect.

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* So great was the deficiency towards the cloſe of laſt war, that the old ſhips intended to keep up appearances only, were ordered to be repaired with aſhen knees and crooks.

have

have been provided. Wherefore, ſooner than lay out of 4 or 5000l. for any length of time, he will give more than its value for a lot that ſuits him. By the third report of the Land Revenue Commiſſioners, it appears, that there are 18,000 acres of land in Dean Foreſt, Glouceſterſhire, deſigned to be ſet apart for incloſure, and the growth of oak timber; but the method propoſed by the ſurveyors is not likely to be productive of ſuch as is moſt valuable; thick planting, with timely thinning, may produce ſtrait boles, and, in a ſuitable ſoil like this, large and long-lived timber; but to raiſe knees and crooks, requires a contrary practice; which, if the ſociety think it worth their attention, I will endeavour to explain hereafter. In the mean time, have incloſed ſuch particulars reſpecting the famous Langley-Wood Oak, as may ſerve to ſtimulate the poſſeſſors of thriving trees, to preſerve them carefully till they indicate approaching decay; whenever that is obſervable, even though in parks and pleaſure grounds, the axe ſhould be applied forthwith; for it is a waſte almoſt as ſhameful to leave ſuch a tree as the Colthorp Oak* to periſh, as it is to cut fourſcore young ones, to ſupply the place of one at full growth. It is not the age, but the condition of the tree, however, that ſhould determine its fate; in ſome ſoils the oak never vegetates freely, becomes ſtunted and dead-topt in its 50th or 60th year; to let ſuch ſtand, even though of ten feet meetings only, is folly; and to cut thriving trees of meetings ſo very ſmall, is madneſs in the extreme. It is, when of this ſize, that they begin to pay beſt for ſtanding; they then yearly improve both in quantity and quality of their contents; the blee leſſens as the ſpine increaſes; the arms become meaſureable one after the other, and though the body may not increaſe in circumference quite ſo much annually*, as it had done when younger; the length and bulk of the limbs will add conſiderably to the contents and value of the timber. If this, Sir, ſhould prove acceptable to the gentlemen of the ſociety, I have minutes of another famous oak, meaſured twice by myſelf, and can trace, I think, the rate at which it proceeded.

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* See Hunter's edition of Evelyn's Silva.

I am, Sir, your very humble Servant,

Boſſington, Hants, T. SOUTH.
Oct. 2, 1790.

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* That accurate obſerver, Mr. Marſham, finds that oaks do not in the ſecond century increaſe ſo much annually in circumference, as they did in the firſt; notwithſtanding which, they increaſe much more in ſolid contents yearly, as I am prepared to demonſtrate.

Dimenſions of an Oak felled in the Year 1758, *in* Langley Wood, *belonging to the Biſhop of* Saliſbury, *upon the Verge of the New Foreſt.*

THIS tree ſtood ſingly in the wood, and extended its maſſive branches near forty feet each way. Its head was all knees and crooks, aptly ſuited to naval purpoſes; its bole or ſhaft was ſhort, not exceeding twenty feet in length, but was full ſix feet in diameter at the top, and perfectly ſound; it was felled in an unuſual manner for the preſervation of its crooks, which were cut off one by one, whilſt the tree was ſtanding, and lowered by tackles to prevent their breaking. The two largeſt arms were ſawed off at ſuch diſtances from the bole, as to make the moſt capital firſt-rate knees; ſcaffolds were then erected, and two pit-ſaws being braced together, the body was firſt cut acroſs half through at the bottom, and then ſawed down the middle perpendicularly, between the two ſtumps of arms that had been left; at the end of one of which, ſtood a perpendicular bough, bigger than moſt timber trees; to prevent this being injured, a bed was made of ſome hundreds of ſaggots to catch it when it fell. This half was ſo weighty, that it cruſhed a new timber carriage to pieces, the inſtant it was lodged upon it; and none in the country being found ſtrong enough, the king's carriage was ſent purpoſely from Portſmouth to convey it to the dock-yard. It was drawn in general by twelve horſes, aſſiſted occaſionally by eight others. The drivers were obliged to find the moſt level ground, and inſtead of drawing it to Portſmouth, as was intended, made the ſhorteſt way acroſs the foreſt to the ſea-ſide.

This tree was ſold in the firſt place for forty pounds; was bought of that purchaſer by the late Mr. White, of Anville, timber-merchant, for an hundred pounds, who is ſuppoſed to have cleared an hundred pounds more; which he poſſibly might do, for the contents, as I was informed a few years ſince on the ſpot, amounted to thirty-two loads of hewed timber, which at half a crown a foot, no unuſual price for naval crooks, amounts to 200l. preciſely, beſides faggots, &c. ſufficient to defray the expences.

N. B. Having tranſmitted this account (through the medium of a friend) to Mr. Marſham, he obligingly returned me the annexed particulars, in the ſum of which, he ſeems to fall ſhort of the quantity I have ſtated; but this is eaſily reconciled;

ciled; his admeaſurements being manifeſtly taken (by a country carpenter) in round timber, and mine from the marks when ſquared, which would make twenty-eight tons, equal to thirty-two loads at leaſt.

Meaſures of the Oak in Langley Wood, felled by Dr. Thomas biſhop of Sarum, in 1758.

Pieces	*Length Feet.*	*Inches Girt.*	*Contents in Cubic feet.*	*Tons.*	*Hogſ bead*	*Feet.*
Body	20	54	405	10	0	5
Limbs.						
1ſt.	30	23	110	2	3	0
2d.	23	19½	60½	1	2	0½
3d.	24	19	60	1	2	0
4th.	28	19½	74	1	3	4
5th.	28	22	94	2	1	4
6th.	20	17	40	1	0	0
7th.	19	13½	24	0	2	4
8th.	23	11½	21	0	2	1
9th.	23	15	35	0	3	5
10th.	13	18	29	0	2	9
11th.	26	13	30½	0	3	½
12th.	20	10½	15	0	1	5
13th.	16	14½	23½	0	2	3½
14th.	25	12	25	0	2	5
			1045½	26	0	6½

There were beſides in ſeveral ſmall pieces of uſeful ſtuff for the navy, 74 feet; ſo in all 28 tons.

The breadth of the tree acroſs (near the ground) where it was cut, was twelve feet, and had above 300 rings of annual growth.

Theſe meaſures were given to Mr. Marſham, of Stratton in Suffolk, by Mr. Fellows, of Shottiſham, Norfolk, brother to Mrs. Eyre of Newhouſe, whoſe carpenter took them by her order.

The account of felling, Mr. Marſham acquaints my friend was nearly the ſame as above.

LETTER II.

On the Growth of Elms.

SIR,

THE elm delights in a rich black mould, where it attains its largeſt ſize. It thrives well, and produces the tougheſt and beſt timber in a hazely loam. It will grow on gravel, but diſgraces chalk, and deteſts moraſs.

It requires an open ſpace, and much room for its roots to ſpread in; if confined in groves, it deceives the planter; the borderers only arrive at perfection, whilſt thoſe near the centre, though ſtraight, are weak; and if through imprudence the large protective trees be cut down, the remainder, inſtead of improving, become dotards; for being relieved from the denſe atmoſphere, which had forced all the ſap the root could imbibe to the upper extremities for vent, their ſhafts break out into innumerable ſprays, that exhauſt the ſap before it reaches the top, which conſequently periſhes for want of ſupply.

Theſe trees ſhould therefore be either planted ſingle, in ſmall clumps, or in hedge-rows. The latter is the moſt profitable method, as the ſuckers which ſpring from the roots will, under the protection of the hedge, furniſh a continued ſucceſſion.

I have heard of elms containing twelve tons round meaſure; ſome of my own are three, one, I believe, ſix or more; and I remember *one*, for which its owner refuſed *twelve guineas.* This was the majeſtick ornament of a pleaſure-ground. Its ſhaft was fifty feet in length, without ſpray or blemiſh; viewed at a diſtance, it made the fineſt maypole that ever eyes beheld, having a round head like a garland at the top. It has been ſince fallen, but what it ſold for, or whither it went, I cannot ſay; though probably to the dock-yard, being fit for a keel of the firſt magnitude. On ſight of this tree, it evidently appeared to have been as much indebted to art as nature for the elegance of its form; and as it grew oppoſite to the centre of a gentleman's man's houſe, I concluded that the gardener who planted, had, with unremitted diligence, attended to its improvement, till trained towards the perfection it at length arrived at.

There is now ſtanding on a knoll, in a meadow of mine, an elm which *was poſſeſſed* of great beauty likewiſe, though of a different kind; the bole of it, which is only eight feet long, was, in 1766, ten feet and a half in circumference at three* feet from the ground. Its branches formed a conoïd, whoſe diameter at the baſe was one and twenty yards. It continued growing in this form till the memorable hurricane on Shrove-Tueſday, 1781, which tore off the lower limbs, and ſpoiled the regularity of its ſhape; thus mutilated, it weathered the ſtorm, which blew down and broke to ſhivers ſeventy others, ſome of which were four tons apiece. Cruel loſs! But why ſhould I lament? The ſame ſtorm that overthrew the timber, purified the air from noxious vapours, and might thus preſerve the liſe of its proprietor. This tree, notwithſtanding its having been ſo much diſmembered, meaſures, in 1790, thirteen feet ſix inches in circumference, at the ſame height from the ground, having gained thirty-ſix inches in twenty-four years, *i. e.* an inch and a half annual increaſe. The amount of the contents, in the ſmall compaſs between the branches and the ground, is amazing, for eight feet by 40 $\frac{1}{4}$ inches girt is equal to 100 feet, or two tons and a half of round timber. The upper part of the ſhaft and the remaining branches are large, ſo that I cannot eſtimate it at leſs in the whole than ſix tons; but it is not of half the value as if the contents had been in one continued ſhaft. This ſtick, though now forming a new and not ungraceful head, muſt, upon the principle before laid down, be fallen within theſe twenty years, or it will rot internally by wet admitted through the ſtumps of the branches.

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* This was then the ſmalleſt part of the bole, and is meaſured from the higheſt ground, it being four feet and upwards on the lower ſide.

No perſon having yet anticipated what may be further ſaid on this ſubject, I ſhall proceed to lay all the plain facts I am maſter of before the Society, and conclude with obſervations, reſulting from ſuch growths as have been particularly noticed by myſelf.

In 1738, an avenue of above ſeventy elms was planted in double ranks by my predeceſſor, in the front of this houſe, the ſummits of their branches are at preſent ſixty feet or upwards. Thoſe in the rows next the ſun are from ſeven feet to ſix, whilſt thoſe in the northern rows, though of the ſame height, are only from ſix to three feet and a half in circumference. One particular tree in the beſt aſpect near the houſe, in 1770, meaſured four feet in circumference at four feet from the ground. Its preſent admeaſurement is ſeven feet ſix inches, *i. e.* a yearly increaſe of above two inches. This is a rapid growth indeed, but is thus accounted for. It obtained more room on cutting down its neighbour, which overhung the houſe, and the root of that being grubbed up, the earth was looſened a great way round, and freſh mould added to preſerve the level. The tree in conſequence put out large branches, following the roots in that direction.

A ſingle row of trees planted in the ſame ſoil, and at the ſame time, are of equal height, but of increaſed bulk; theſe are from eight feet two inches, to ſeven feet in circumference, at the ſame diſtance from the ground, and contain on an average almoſt double the timber, *viz.* ſome of them near two tons.

In 1766, I planted three hundred elms, ſome ſingle, others in clumps, the remainder in hedgerows, and in the two following years, filled up the vacancies cauſed by failure. One of the ſingle trees is now three feet four inches and a half in circumference,* the ſhaft is about twelve feet long, and the head proceeds in four equal upright branches.

The next largeſt is alſo a ſingle tree, having a long ſtraight ſhaft near thirty feet to a bough, and upwards of forty feet to the ſummit of its branches, its circumference is two feet eight inches only. But the timber of this tree will, from its length and ſtraightneſs, yield double the price of that of the other hereafter.

Thoſe in the clumps keep pace with this in height, but do not equal it in bulk.

Thoſe in the hedge-rows were of different ſorts, the beſt of them came from a nurſery at Southampton, and are now about the ſize of thoſe in the clumps; the others from Saliſbury; theſe did not from the firſt appear to have been free growers, and the longer they ſtand, the further they will be behind their competitors. All theſe have thrown out numerous ſuckers from their roots, ſo that where one hundred and fifty only were planted, there are now five hundred at leaſt. N. B. Some of the offſpring of the Saliſbury trees, promiſe to be timber before their parental ſtocks.

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* N. B. The circumference of all theſe was taken at four feet from the ground.

Elms may be raiſed by protection only; for the ſtool of a timber-tree when fallen, will throw up many ſuckers; fence theſe round with rough railing, and in eight or ten years they will be out of danger of cattle. They at firſt proceed ſlowly, but if duly thinned, and trained properly, will make good trees. The way to thin them to advantage, is to dig deep amongſt them the year before; cutting off the roots of the weakeſt, which cauſes them to throw out freſh fibres, and fits them for removal. About ſix years ago, my gardener trenched a piece of uſeleſs ground behind ſome cottages, and planted it with refuſe ſuckers thus prepared. The poor people availed themſelves of the circumſtances, ſet the ground with beans and potatoes, and have continued to crop it ever ſince. This has been of ſervice to them, and of infinite benefit to the trees; which by means of this annual culture, have far outſtript their undiſturbed brethren, and almoſt double their contents.

The ſuckers adhering to old ſtools, do not keep pace with maiden trees planted of the ſame ſize:

the reaſon is obvious; the roots they throw out are for a long while confined to a ſoil already exhauſted by a like production, which checks their progreſs. If the ground between them were to be dug once a a year, and a few barrows of very rotten dung* turned in for two or three years ſucceſſively, I doubt not but they would pay by the quickneſs of their growth; but it is an experiment I have not tried.

The ſuckers which ariſe from my young trees in the hedge-rows, grow faſter than new-planted maiden trees of the ſame ſize, having freſh mould to root in, and receiving at the ſame time, ſome nouriſhment from the parental ſtock. The planting elms in hedge-rows is nevertheleſs in ſome reſpects objectionable, for the tenant in general thinks himſelf intitled to their ſhrouds, which he lops in a ſlovenly manner, at ſuch time as he deems moſt profitable, *viz.* every twelve or fourteen years. The faggots are then an object of ſome conſequence, as well as the relief he gives to his paſtures and crops. But the misfortune is, that the wounds he makes are too large to heal over; the knots become turgid, inſtead of ſmooth, admit water, and injure the timber. To prevent this, they ſhould be trained for the firſt thirty years with circumſpection. By repeated trimmings at ſhort periods, the ſhafts will be rendered clean and unproductive of ſprays, and the heads reduced into a narrow compaſs, and at ſuch a height from the ground, as neither to annoy the crops, or ſour the graſs by ſhade.

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* Mr. Marſham's famous oak, of his own planting, has been much forwarded by digging round and manuring it.

In conſequence of a doubt being ſtarted, whether the ſhaft of a tree lengthens inch by inch through its whole extent, or only by the addition of new wood to the top;—in March, 1786, after trimming up three young elms, I ſhortened the underbough that was left in each, and dropt a line and plummet to the ground. The length of the ſhaft, No. I. was twenty-ſeven; of No. II. twenty-eight; of No. III. thirty feet; at which lengths I opened the ſtrands of the line, and inſerted a mark of red tape, put it carefully by till March 1790, when trimming the trees afreſh, as is my conſtant practice every fourth year, the line, when applied with its marks to the foot of the ſame branch in each tree reſpectively, held the plummet ſuſpended above the ground, and proved an uniform advance in length of their ſhafts, from eight to ten inches; the ſhorteſt having gained the leaſt, the longeſt the moſt, *viz.* two inches and a half in a year.

Obſervations and Concluſions drawn from the preceding Premiſes.

1ſt. As the growth of Elm bears proportion to the extent of ground allotted for its roots to range in; thoſe who would propagate large timber, muſt never plant too cloſe.

2dly. That though branchy elms are the quickeſt growers*, they are not the moſt profitable to the planter; for ſuch timber is little ſought after, and one branch only being accepted by the merchant as timber, the reſt all go with the top, which reduces the contents exceedingly.

3dly. That as the value of this timber conſiſts more in the length and bulk of the ſhaft, than in the crooks and contents of its branches, it is the buſineſs of planters to train them up tall and ſtraight, to keep their ſhafts clean, and not to ſuffer them to branch till within a few feet of the top.

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* That branchy trees are the quickeſt growers, I believe to be invariably the caſe, and may be thus accounted for: the ſap imbibed by the roots, is a compound of aqueous and nutritious matter; the quicker it is in its paſſage, the greater is the demand upon the roots, which extend themſelves accordingly in ſearch of freſh ſupplies; the branches follow their direction, and ſtill increaſe the demand; and the more branches a tree has, and the nearer they are to the ground, the ſooner the ſap perſpires off its aqueous particles, depoſiting the nutritious ones by the way. Wherefore the timber is more amply fed by an accelerated current of ſap, than by a tardy one, conſequently branchy timber increaſes more in proportion, than that which is clean ſhafted, where the ſap is longer in its progreſs, finding no outlet till it reaches the top.

4thly. The preſent method of lopping, though conducive to the lengthening of the ſhaft, fills it full of rough protuberances, which, by admitting water, are very prejudicial to the timber, and occaſion the defects ſo generally complained of.

5thly. The ſhaft of the elm advances inch by inch through its whole contents, that is, every inch lengthens yearly; by this means it advances more or leſs in proportion to its length, beſides the addition of new wood at the top; ſo that a branch now thirty feet from the ground, will (in a growing ſtick) five years hence be removed higher by a foot, conſequently the timber is increaſing in length beneath that branch, as well as above it.

Laſtly. The growth of elm is to that of oak, in a hazely loam like mine, as three to two, and the value of the timber, if long and ſtraight, as two to three. The profits of the planter, therefore, both in oak and elm, will be nearly on an equality.

To train up Elms to long ſtraight Shafts.

Care ſhould be taken in planting, to ſhorten all the ſide-ſhoots, and leave the leading ſhoot intire.

In three or four years afterwards, cut the lowermoſt of the ſhortened ſhoots clean off, and ſhorten moſt of the maiden ſhoots above them, carefully preſerving the leading ſhoot, and prevent its having a competitor; at Midſummer following, ſtrip off all ſuch ſprays as have put forth from the ſides of the wounds (by hand.)

Proceed in this manner every three or four years, cleanſing about four feet of the ſtem at a time, ſhortening the upper branches, cutting off cloſe thoſe which were ſhortened at the preceding trimming, and ſtripping afreſh at Midſummer, till thirty or forty feet of ſhaft is obtained without ſpray or blemiſh; they may then be left to themſelves, for the ſhaft will lengthen ſome feet, and ſhould they put out more ſprays from the lips of the old wounds, ſuch may be ſtripped off by hand, from time to time, till this vicious inclination ceaſes. Beautiful and valuable timber will be thus obtained at a very trifling expence, which the pea-ſticks that come off will nearly defray.

The advantage that ariſes from ſhortening ſome of the maiden ſhoots at every trimming, conſiſts in checking their growth; which cauſes them to be ſmall at the baſe, in proportion to the bole of the tree*; conſequently the wounds are but trifling, ſoon heal over, and the bark becomes ſmooth. It is adviſeable to prevent theſe trees from forking at the top as long as poſſible, for they are very apt to break off at the forks which injures the timber.

Boſſington, Oct. 25, 1790.

LETTER III.

ABELE.

SIR,

THE rapid growth of this timber having been already aſcertained by a former correſpondent, I have little to add, ſave that not being ſubject to the ravages of the worm, it is applicable to more uſeful purpoſes than that gentleman has aſſigned to it†. After the ſtorm in 1781, which not only blew down my elms, but my barns likewiſe, I rebuilt one of five bays, and twenty-four feet long in the beams, and roofed it intirely with this timber; and from the experience of others, together with the preſent appearance of beams, rafters, &c. have reaſon to think that my grand-children will not find fault with it. In an out-houſe roofed at the ſame time with elm, there are manifeſt ſigns of the worm already, which will in the end deſtroy it. But let it not be underſtood, that I recommend the uſe of abele under any covering but thatch, which if not ſuffered to gully into holes will always protect it from wet, on which alone the durability of the timber depends; the drippings from a broken tile, ſlate, &c. cauſe it ſoon to periſh.

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* I ſcarce need ſay that bole and ſhaft are ſynonymous terms.

† I think Abele muſt be too ſpongy for the turner.

Theſe trees are often ſubject to warty excreſcences, which, when large, imbibe moiſture, and bring on decay. Whilſt the plants are young, they do little injury, yet it is adviſeable to root up ſuch as are much disfigured with them, to give room to thoſe which are healthy. I have ſome of the true Abele or Populus Alba, which are now forty feet long in the ſhaft, and ſix feet four inches in circumference at five feet from the ground; their exact age I do not know, but their contents exceed two tons of timber each, and I judge them to be fifty years old.

The ſpecies your correſpondent mentions, (as received under the denomination of the Dutch Beech) ſurpaſſes them in quickneſs of growth. But I much ſuſpect that his trees are very branchy.

ALDER,

As patten-makers timber merits little regard, but being the moſt beautiful of the whole aquatic tribe, is extremely ornamental along the banks of ſerpentine rivulets, or planted as ſingle trees in ſpringy gravels, or peaty bogs, where little elſe will grow. Placed in a border round abeles, the latter run above them, and form a pleaſing contraſt.

From the authority of great maſters in their way, Miller, Mortimer, &c. I was induced to plant a waggon-load of truncheons, in the year 1764, in ſituations above deſcribed. I was flattered the next ſummer with every proſpect of ſucceſs, their ſhoots being ſtrong and groſs, but lo ! the year following, one and all periſhed, not having ſtruck a ſingle root. Being ſatisfied that this could not be owing to a defect in the ſoil, I replanted the ſame in 1766, with ſmall-rooted ſlips taken from old ſtubs, few of which failed; moſt of them have been cut twice for bruſh-wood, poles, &c. and of thoſe planted ſingle, one has formed a conical top of great beauty, and its bole is three feet ſeven inches in circumference, midway between the branches and the ground.

Mr. Miller recommends this timber as excellent in water-works, but I can ſay nothing of its merits myſelf, having never tried it. When charred it makes the beſt coal for gunpowder.

ASH.

The growth of aſh in ſoils adapted to its nature, is little inferior to that of elm or beech.* But there is no timber whatſoever that differs more in its value than this does, according to its ſituation. The productions of dry and healthy ground (unimpaired by the farmer's bill-hook) will prove acceptable to moſt purchaſers. Thoſe of woods are generally clean in the ſhaft, free-cleft, and more valuable than the former. The nearer the ground, the tougher is the timber, the ſhaft therefore is coveted, the brittle branch rejected.†

If theſe trees are removed when ten or twelve feet high, their grain acquires a degree of tenacity very prejudicial to the timber. My predeceſſor, about the year 1750, planted a row of them in a place ſince converted into a garden. Their ſhafts were apparently ſo clean, as to engage a cooper's notice, who purchaſed them at a good price, *viz.* 36s. per ton, but told me afterwards, they were clung, and did not anſwer his purpoſe,* ſo he reſold them to a country carpenter at a loſs. One of theſe trees, which was left ſtanding, meaſures now four feet eight inches in circumference at four feet from the ground.

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* Vide p. 445, Society's Mem. vol. 5.

† The buyers of this timber accept the ſhaft and its continuation, or beſt bough; the reſt, be they ever ſo large, go with the top.

Aſh timber, when raiſed in damp meadows, or mooriſh ſoils, becomes light, ſpongy, brittle, and of ſmall value, in compariſon of that on dry and healthy ſpots. In meadows, they will attain a ſize † which cannot be expected in moors and bogs; for when the roots reach the peat, the bark grows moſſy, and the top decays; how long ſtubs may be productive of poles, in ſuch ſituations, remains to be determined, but experience convinces me, that aſh, thus planted, will never become timber of any value, as the roots muſt periſh before the tree arrives to perfection.

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* i. e. They would not cleave into hoops. *Clung*—a provincial term, ſignifying that the grain adheres too cloſely to ſeparate freely.

† An aſh in my mill mead, which in 1760 contained 34 feet of timber, being apparently at a ſtand, was felled laſt ſpring, and then meaſured 60 feet, *viz.* an increaſe of 26 feet in thirty years. It was a fine butt to look at, but was eſtimated at no more than 25s. per ton. N. B. The top had been decaying, and the growth ſtagnated for five or ſix years paſt?

Aſh trees in dairy plots are nuiſances, as their leaves make the butter rancid and worthleſs; mixed with beeches in an open grove, they run to great lengths, are free-cleft, and make valuable timber. Coach-makers, wheelwrights, &c. like the ſhafts when a little bent, more than when perfectly ſtraight. The cooper has no objection to the latter.

BEECH.

The propagation of Beech is ſtrongly to be recommended as a free-grower, and applicable to many uſeful purpoſes. It ſaves oak (as before mentioned) in planking ſhips bottoms, and in ringing mill-wheels; its cloſe grain and firm texture render it unparalleled in water-works of all kinds, for when conſtantly kept wet, it appears as perfectly ſound at forty years end,* as when firſt immerſed. The mortices and tenents chafed by the influx and eflux of water will in time be the one enlarged, and the other diminiſhed, but the wear in this timber is nothing like ſo great as that in elm; wherefore head-cells in mill races, wiers, &c. ſhould be of beech, in preference to any timber whatſoever; and, as the very offal is the moſt valuable cleft-wood, yielding a guinea a cord to the malſter, there are few trees more profitable to the planter in countries where there is a demand for it. The beech is the chief ornament of the Cheltern-hills in Buckinghamſhire, and of the Horſe-ſhoe hills in this county. It delights in chalky ſoils and lofty ſituations; it is more profitable in open groves or mingled with aſh, than in coppices of underwood; it runs up in the former with a long clean ſhaft, it branches in the latter to the deſtruction of all around it.* Yet both length of ſhaft and branchy crooks have in this timber their reſpective values for the purpoſes above-noticed, which makes me wonder, that the timber bears no greater price than from 6d. to 8d. a foot, whilſt elm fetches 10d. and a ſhilling.† I have many beeches of large ſizes ſize, and great beauty; one that has been meaſured repeatedly was, at Midſummer 1769, ſix feet two inches and a half in circumference, at five feet from the ground*, and at Midſummer laſt, was eight feet, ſeven inches and a half, *viz.* it increaſed twenty-nine inches in twenty-one years, being above one inch and one third yearly. The ſhaft of this tree is about forty feet long, as ſtraight as an arrow, it breaks all round into ſmall branches, and contains between two and three tons of timber.

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* Of this I have had frequent proof, having known the ſame beechen cell, when turned, and freſh morticed, laſt two wiers, and ſound enough afterwards to make the plating of an outhouſe.

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* N. B. Nothing but holly will grow under the drip of beech, (trufles only excepted.)

† Notwithſtanding the body of the beech, however clean, fetches a price inferior to ſtraight elm, yet the limbs and offal are worth more than thoſe of elm, and there is a difference of meaſure which brings them nearly to a par in price, for the buyer claims an allowance of an inch in a foot girt, on account of the roughneſs and thickneſs

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neſs of the bark in the latter, but claims no deduction for the ſmooth bark of the former; another conſideration for the planter is, that elm requires a ſoil worth 20s. per acre, whilſt the beech will grow in white land, ſcarce worth 7s. per acre.

* That is, five feet on the lower ſide, or four feet on the upper. Query, What will be the contents of this tree at 24 years end, after the ſame rate of growth?—A ſhaft tapering regularly from a circumference of 8 feet 8 inches at its baſe, to four feet at its ſummit, will girt 19 inches in the middle; for the girt at top 12 inches, added to the girt at bottom 26 inches, are equal to 38, which divided by 2, are equal to 19 inches the girt midway; and 40 feet by 19 girt, are equal to 100 feet of timber, its preſent ſuppoſed content. Then at 24 years end, allowing an inch only in a year for the extenſion of the ſhaft in length, it will have gained two feet additional length, and 24 times one inch $\frac{1}{3}$, are equal to 32 inches, equal to 8 inches girt, added to its preſent meaſure 19 inches, are equal to 27 inches; then 42 feet by 27 inches, are equal to 212 feet, ſeven inches; ſo that in 24 years it will gain 112 feet, viz. it will more than double its preſent contents, which it has been ſixty years at leaſt in attaining.—May this prove an incitement to thoſe who have thriving trees, to preſerve them, till they have apparently done growing!

In the year 1768, I planted ſome hundreds of young trees in ſingle and double rows along the ſide of chalky hills. Theſe are now thirty feet high, and in circumference from eighteen to twenty inches at four feet from the ground; they were originally drawn from the woods from three to four feet high, and a general failure being prognoſticated by unſucceſsful beech-planters, I placed them thicker than I would have done, and planted them alternately, the beſt at full length, and the worſt cut down to the loweſt eye, which was left even with the ſurface of the ground; there were not one in an hundred of the former which lived, nor one in a hundred of the latter which failed. An upright growth of thirty feet, in two and twenty years, in a poor ſhallow ſoil, is as much as could be expected; they would have increaſed faſter in bulk, if they had been permitted to have ſpread; but my deſign being to draw them into long ſhafts, they were frequently trimmed for that purpoſe, and promiſe to make fine trees hereafter.

N. B. Beeches may be trained to long ſtraight ſhafts, after the manner of elms, with this difference only—that a ſpray muſt be left near the end of every ſhortened branch to keep it alive, otherwiſe it periſhes, and becomes a faulty knot.

Beeches are the worſt neighbours oaks can have, they grow ſo much faſter, and extend their roots ſo far as to weaken, if not ſtarve them. When the former overhangs the latter, that aſſuredly dwindles, becomes dead topped, and worthleſs.

FIR.

Though I do not think the Scotch Fir in this country can ever equal the Yellow Deal from the Baltick, yet it may be worth propagating, as of uſeful purpoſe in ordinary buildings. The dryer the ground on which this timber grows, the ſlower is its progreſs, but the cloſer are its pores, and the more ſuperior its quality.* When planted in rich land, theſe trees will ſhoot three or four feet in a ſeaſon, and equal, if not ſurpaſs the abele in growth. My plantations, though chiefly confined to chalky banks, in a north-weſt expoſure, evince, that when once rooted, few obſtacles will prevent a profitable progreſs. From obſerving the miſtakes of others in endeavouring to ornament their naked downs too ſuddenly, I learnt the neceſſity of planting firs, when a foot high only, and by opening the ground ſome time before, inverting the turf at the bottom of the holes, and throwing the mould upon it in hillocks, to meliorate, my plantation ſucceeded well; for though the ſoil is ſcarcely ſix inches deep, the firs, ſet in 1766, are now thirty feet high, and from two feet ſix inches to two feet in circumference, at four feet from the ground; ſome few planted at the ſame time, in a deeper ſoil, and warmer ſituation, are now above three feet round.

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* I ſhould imagine, that the firs planted by Mr. Allen, near Claverton Down, will prove very fine timber hereafter.

Spruce firs planted in 1766, likewiſe in a tolerable good ſoil, are now forty feet high, and from two feet ten inches and a half to three feet round.

I have ſeen plantations which far ſurpaſs either of theſe in growth, but they occupied ground infinitely more valuable.

Yours, &c.

T. SOUTH.

LETTER IV.

Deſcription of Fyfields Oak, now ſtanding in a Wood near Romſey in the County of Southampton.

SIR,

THIS tree, in 1788, was ten feet eleven inches, and is now nearly eleven feet one inch in circumference, at ſix feet from the ground.

	feet	inc.
It is in height to the firſt live branch	21	6
From thence upwards, to where the bole leſſens ſuddenly, is at leaſt an equal diſtance,	21	6
Thus far it diminiſhes gradually, like the maſſive ſhaft of a Doric column. The continuation of the bole extends near 12 feet farther; and by comparing it with a tree at hand, it appeared to be 5 feet in circumference, and at the height of 50 feet from the ground - - -	12	0
Length of the bole - -	55	0
	or more.	

The very top branches are timber, the tree appears to be in a growing ſtate, and though tradition ſays it is 150 years of age, its yearly increaſe is little (if any thing) leſs than an inch, and the beſt judges allow it to contain twelve loads of timber at leaſt.

From theſe given premiſes, I will endeavour to lay down a ſketch of its progreſs during the latter half of its exiſtence, in order to demonſtrate that oak-timber will pay its poſſeſſor good intereſt for ſtanding till it arrives at maturity. But in ſo doing, I muſt deviate from the true form of the upper branches, (becauſe it would be difficult to calculate their real progreſs, without meaſuring them) and imagine the head to be divided into four equal ones; for the purpoſes of proving, in the firſt place, the impoſſibility of their being timber at the outſet of the calculation, and in the ſecond, that they will continue to bear their proportion to the increaſe of the ſhaft; which I ſhall attempt in a manner ſo plain and ſimple as to be intelligible to the common farmer.

It will be allowed, I preſume, that an oak, in a good ſoil and ſituation, may, at 75 years from the acorn, have acquired 40 feet length of ſhaft, being 14 inches girt at the baſe,* 12 in the middle, and 10 inches at the top. Suppoſe this terminating in four equal branches, then it is manifeſt, that none of theſe branches can be meaſurable timber at this time;† for their aggregate contents at the baſe cannot exceed the ſimple content of the top of the ſhaft, which is under 12 inches girt.

The meaſure of ſuch an oak will be a ton, and its value, as being under naval ſize, three pounds at the moſt.

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* What is called the girt of timber, is one-fourth part of its circumference.

† Oak timber is meaſurable as far as it holds ſix inches girt, and no farther.

Then,

Then, in a moderate way of growth, it will increaſe one inch in circumference, being one quarter of an inch girt yearly; and as it is found by experiment, that a ſhaft of elm, thirty feet long, extends itſelf ten inches in four years, we may at leaſt allow an inch a year for ſuch extenſion in a ſhaft of oak of forty feet. It follows then, that at the end of twelve years, when eighty-ſeven years of age, the ſhaft will be a foot longer, and having increaſed in girt three inches, it will meaſure forty feet in length by fifteen inches girt, equal to ſixty-four feet nine parts, the content whereof will be one ton, twenty-four feet, nine parts. As the ſhaft is now increaſed to more than twelve inches ſquare at the top, the four branches will begin to be meaſurable at the baſe.

In the next twelve years, at 99 years of age, proceeding at the ſame rate, it will have acquired another foot additional length of ſhaft, and three inches increaſed girt; and will meaſure as follows, *viz.* 42 feet by 18 inches girt, (equal to 94 feet 6 inches) the content whereof is 2 tons, 14 feet, 6 in. and the four branches will be meaſurable timber to the length of two feet each, and their contents, if ſeven inches and a half girt, will be 2 tons, 17 feet, 7 inches.

In the next twelve years, (at 111 years of age) a third foot is added to the length of the ſhaft, and it becomes 21 inches girt; its contents then will be 3 tons, 11 feet, 8 inches, and the four branches will become meaſurable, four feet in length, and girt nine inches, conſequently will contain 3 tons, 20 feet, 8 inches.

The next twelve years, (when 123 years of age) by acquiring another foot of ſhaft, with a girt increaſed to 24 inches, it will contain 4 tons, 16 feet, and the four branches will be meaſurable, ſix feet in length, at 10 inches girt, containing 16 f. 8 in. making in all 4 tons, 32 feet, 8 inches.

We will now allow 13 years for a like addition to the length and girt of the ſhaft, which (at 136 years of age) will then be 45 feet by 27 inches, equal to 5 tons, 27 feet, 9 inches; the four branches will be meaſurable nine feet in length, and girt 11 inches, equal to 30 feet, 4 inches; together will containing 6 tons, 18 feet, 1 inch.

Laſtly, we will take 14 years to ſupply an additional foot to the length, and three additional inches to the girt of the ſhaft; which will then be 46 feet long by 30 inches girt, equal to ſeven tons, ſeven feet, and the four branches will become meaſurable, 12 feet in length, and girt 12 inches, equal to 1 ton, 8 inches; and the whole contents (at 150 years of age) will be equal to 8 tons 15 feet, round meaſure, *viz.* 12 loads of ſquare timber, value 48*l.* to 50*l**.

The growth of this capital ſtick, being thus traced without exaggeration, it may ſerve to ſhew the manifeſt diſadvantage of cutting young trees in ſoils which will bring them to maturity.— Its firſt 75 years were ſpent in acquiring a ſingle ton; whereas, the laſt 75 years produced above ſeven times as much in quantity, beſides the increaſe of value as naval timber; which taken together will pay its proprietor compound intereſt at 3*l.* 15*s.* per cent. for the latter period; and who can lay out money to ſo great advantage, conſidering the fluctuation of the ſtocks in the firſt place, (lucky hits only excepted) and the irregularity of the payments of intereſt, and the inſtability of private ſecurities?

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* A ton of round was always reckoned equal to a load and a quarter of ſquare timber, but the hewers now manage their buſineſs ſo dexterouſly, as to bring it equal to a load and half. Thus the ſurveyors of Dean Foreſt eſtimate 14,400 tons, girt meaſure, to amount to 21,600 loads, ſquare meaſure, and value it at 4l. per load. Vide Commiſſioners' third Report.

By Smart's Tables it appears,

That the amount of 1l. in 75 yrs. at 4 p. cent. compound intereſt,
£.*Decimalpts.*
is - - - - - - - =18,9452,5466
And in ſame time at 3½ p. ct. =13,1985,5083 which added together,
and divided by 2
quotes - 2)32,1438,0504

The amount of 1l. for 75 years at 3l. 15s. per ct. } £.16,0719,0252
Which multiplied by - - - - - 3 The value of the tree at
the commencement of the term, produces } £.48,2157,0756 { the amount of 3l. in 75 ys. at 3l. 15s. compd. intereſt

Mr. Marſham, for whoſe opinion I have a great veneration, obſerves, that trees which increaſe one inch and a half per annum in circumference, during the firſt century, do not gain ſo much in circumference in the ſecond. Though I allow this to be the caſe, it will appear, that they increaſe more in their ſolid contents notwithſtanding.

In proof whereof,

ft. *in.*
Take the difference between 131 8 the contents of the ſhaft in its
hundredth year, and - - 94 6 its contents in preceding period,
and divide it by the No. of ys 12) 37 2 (quotes 3f. 1 inch for its annual increaſe,
3 1
between the 87th and the 100th year of its growth. Then take
the difference between - 287 0 the contents of the ſhaft in its
150th year, and - - - 227 9 its contents in the period immediately preceding,
and divide by the No. of ys. 14) 59 3 (4 f. 2⅓ inches.
33
5

Shews, that notwithſtanding its annual increaſe in circumference was diminiſhed, yet the annual increaſe of its ſolid contents was greater by one foot one inch and 1-third, from the 135th to the 150th year of its growth, than it was between the 87th and the 100th year, beſides the increaſed meaſure of its limbs not taken into conſideration.

Were an accurate regiſter to be kept of the growth of oaks for 150 years together, (as an ingenious correſpondent has wiſhed) we ſhould then be at a certainty reſpecting it; and not depend upon conjecture, as in the preſent inſtance; but in which there being no intention to deceive, and the inferences being fairly drawn from known circumſtances, the concluſion cannot deviate widely from the truth.

As the obviating objections is preferable to the anſwering them, and the increaſe of the branches may, to perſons little converſant in timber, appear in this calculation far too great; I think it neceſſary to explain the principles on which I proceeded.

It is evident, that the contents of the limbs, be their number more or leſs, amount in the whole to the quantity of timber the ſhaft would have contained, had it extended itſelf upwards to the length the branches are meaſurable. The four imaginary ones that I have adopted, therefore, may be conſidered as a continuation of the ſhaft to the extent of 12 feet. Then,

As the top of the ſhaft in its 75th year was equal to 10 feet girt; in its 99th year, by the addition of one-fourth of an inch yearly, it will girt 16 inches in that place; leſſening in its advances towards the top, which is ſuppoſed to have gained two feet; this at 15 inches girt is equal to three feet one inch.

In its 111th year, the ſame part of the ſhaft will be 19 inches girt; and four feet the ſuppoſed length of additional timber will be equal to nine feet, as the mid-girt will be 18 inches only.

In the next period, the girt at the ſame place will be 22 inches. This, if continued ſix feet, at 20 inches only in the girting-place, is equal to 16 feet eight inches.

To proceed: the old top of the ſhaft now takes 13 years to increaſe to 25 inches, and its advanced length 9 feet, will, at 22 $\frac{1}{4}$ inches girt, be equal to 30 feet 4 inches; and

Laſtly, the ſaid top increaſes to 28 inches girt, and the additional length of timber, being 12 feet at 24 inches girt, equal to one ton eight feet, ſet down as the meaſure of the branches; which, it may be obſerved, are here ſuppoſed to lengthen more than in proportion to a foot in a period, though the ſhaft was confined to that extent; as in fact branches when they become timber, always do. For being of great length, before they attain meaſurable ſubſtance; upon their increaſe in bulk, the menſuration extends as rapidly at leaſt, as the progreſs here aſſigned to it; *viz.* from two to three feet in 12 or 14 years. Thus large branches in oak, contribute greatly to the increaſe and value of the timber, as is evident by that of Langley-Wood.

In the manor of Dibden, belonging to Lord Malmſbury, on the eaſtern bounds of the New Foreſt, are ſome capital oaks; one in particular is larger than Fyfields at equal diſtance from the ground, but inferior to it in height and ſolid contents. This is 11 feet eight inches round; at ſix feet the ſhaft is ſtraight, and exceeds 30 feet in length; it has four or five large branches, and may contain about eight loads of timber. A lower limb or two has been mutilated, yet the tree is at preſent ſound, but ſeems nearly at its beſt.

The three inſtances of well-grown oaks before ſtated are enough to ſhew the advantage accruing to their owners, and the community in general, by refraining from cutting trees whilſt thriving. Thoſe who would ſeek for more, and are within reaſonable diſtance, I would refer to Longleat; where there are many objects of this kind, of ſufficient grandeur to excite their emulation. May the noble poſſeſſor long enjoy the pleaſure of ſetting ſuch an example of forbearance; and may his Lordſhip leave it in charge with his deſcendants, to watch over the oaks he has brought to ſuch perfection, and convert them to naval purpoſes on the firſt apparent indication of decay; by no means ſuffering ſuch valuable productions to moulder away in burly deformity, millennial monuments of their owner's folly, from generation to generation hereafter!

Of ſuch, there are too many at this time extant; the Cawthorp Oak, though a magnificent ruin, with the Greendale Oak delineated in Hunter's edition of Evelyn's Sylva, and Bull-oaks, in various places, are of this number. The latter are thus denominated, from the no uncommon circumſtance of bulls taking ſhelter within them, which theſe animals effect, not by going in and turning round, but by retreating backwards into the cavity till the head only projects at the aperture. The one I am about to particularize ſtands in the middle of a paſture, bears the moſt venerable marks of antiquity, gives the name compounded of itſelf and its ſituation to the farm on which it grows, *viz.* Oakley Farm, and was the favourite retreat of a bull. Twenty people, old and young, have crouded into it at a time; a calf being ſhut up there for convenience, its dam, a two-year-old heifer, conſtantly went in to ſuckle it, and left ſufficient room for milking her. It is ſuppoſed to be near a thouſand years old; the body is nothing but a ſhell, covered with burly protuberances;* the upper part of the ſhaft is hollow like a chimney, it has been mutilated of all its limbs, but from their ſtumps ariſe a number of ſmall branches, forming a bruſhy head, ſo remarkable for fertility, that in years of plenty it has produced two ſacks of acorns in a ſeaſon. Theſe particulars, extraordinary as they may ſeem, I had from the farmer's own mouth, whoſe father and himſelf have occupied the land for very many years, and from appearances I think they may be credited. About twenty years ago, I had the curioſity to meaſure this tree; its head was as green and vigorous laſt ſummer as it was at that time; and though hollow as a tub, it has increaſed in its meaſure ſome inches. Upon the whole, this bears every mark of having been a ſhort ſtemmed branchy tree, of the firſt magnitude, ſpreading its arms in all directions round it. In memory of the preſent tenant, the laſt remaining branch, one of the ſmalleſt, was found, extended forty feet from the trunk, and was cut off in his father's time for repairs upon the farm.

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* It meaſures in the middle round theſe burls 29 feet 3 inches, round the ſtumps of the old arms 31 feet 6 inches in the ſmalleſt part; between two and three feet from the ground it is 26 feet in circumference.

The aperture is a ſmall ill-formed Gothic arch, hewed out, or enlarged with an ax, and the bark now curls over the wound—a ſure ſign that it continues growing; and hence it is evident, that the hollow oaks of enormous ſize, recorded by antiquaries, did not obtain ſuch bulk whilſt ſound, for the ſhell increaſes when the ſubſtance is no more. The blea, and the inner bark, receive annual tributes of nutritious particles from the ſap in its progreſs to the leaves, and from thence acquire a power of extending the outer-bark, and increaſing its circumference ſlowly. Thus a tree, which at 300 years old was ſound, and ſix feet diameter, like the Langley Oak, would, if left to periſh gradually, in its thouſandth year become a ſhell of ten feet diameter; and hence it is natural to conclude, (as appearances juſtify it) that this tree, when in perfection, was nearly, if not quite, equal to that amazing one which belonged to the biſhop of Saliſbury. How ſhameful, to let nature have produced an oak like this in vain!

I am, &c. &c.

Boſſington. T. SOUTH.

*Dimenſions of the Bull Oak, in Wedgenock-Park, Warwickſhire.**

	yd.	f.	in.
1 yard from the ground - -	11	1	0
1 foot above the ground - -	13	1	0
6 feet from the ground - -	12	1	0
Broadeſt ſide - - -	7	0	5
Cloſe to the ground - - -	18	1	7
Height of the trunk, about -	4	1	0

The inſide is quite decayed; and when I ſaw it, a cow and a ſheep had ſheltered themſelves within it. The head is very round and flouriſhing.

T. O.

* Gent. Mag. Sept. 1783.

LETTER V.

*An Eſſay on the Growth of Oaks, and on the Production of Crooked Timber for Naval Purpoſes.**

"Let India boaſt her plants, nor envy we
"The weeping amber and the balmy tree,
"While by our Oaks the precious loads are born,
"And realms commanded which thoſe trees adorn."
POPE.

SIR,

PROVIDENCE with infinite wiſdom hath ordained, that every country ſhould abound in productions the moſt uſeful or ſalutary to its inhabitants.

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* Among the amuſements which the country affords, I know none more delightful in itſelf, and beneficial to the publick, than that of *Planting*. I could mention a nobleman, whoſe fortune has placed him in ſeveral parts of England, and who has always left theſe viſible marks behind him, which ſhew he has been there; he never hired a houſe in his life, without leaving, all about it, the ſeeds of wealth, and beſtowing legacies on the poſterity of the owner. Had all the gentlemen of England made the ſame improvements upon their eſtates, the whole country would have been at this time as one great garden. Nor ought ſuch an employment to be looked upon as too inglorious for men of the higheſt rank. There have been heroes in this art, as well as in others.[a] We are told in particular, of Cyrus the Great, that he planted all the Leſſer Aſia. There is indeed ſomething truly magnificent in this kind of amuſement:

[a] William Duke of Cumberland, Bagſhot Heath.

bitants. This ſea-girt iſland depends upon oaks for its commerce and protection. Theſe are found therefore in a variety of ſoils, in lands both ſtiff and light, both wet and dry but attain their fulleſt magnitude

ment: it gives a nobler air to ſeveral parts of nature; it fills the earth with a variety of beautiful ſcenes, and has ſomething in it like creation. For this reaſon, the pleaſure of one who plants is ſomething like that of a poet, who, as Ariſtotle obſerves, is more delighted with his productions, than any other writer or artiſt whatſoever.

Plantations have one advantage in them, which is not to be found in moſt other works, as they give a pleaſure of a more laſting date, and commonly improve in the eye of the planter. When you have finiſhed a building, or any other undertaking of the like nature, it immediately decays upon your hands; you ſee it brought to the utmoſt point of perfection, and from that time haſtening to its ruin. On the contrary, when you have finiſhed your plantations, they are ſtill arriving at greater degrees of perfection as long as you live, and appear more beautiful in every ſucceeding year than they did in the foregoing.

But I do not only recommend this art to men of eſtates as a pleaſing amuſement, but as it is a kind of virtuous employment, and may therefore be inculcated by moral motives; particularly from the love which we ought to have for our country, and the regard which we ought to bear to our poſterity. As to the firſt, I need only mention, what is frequently obſerved by others, that the increaſe of foreſt trees does by no means bear a proportion to the deſtruction of them, in ſo much that, in a few ages[b] the nation may be at a loſs to ſupply itſelf with timber ſufficient for the fleets of England.

Spectator, No. 583—*20th Auguſt*, 1714.

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[b] The writer little thought, that in leſs than one age, his prediction would come to paſs.

nitude in rich black earth, in ſtrong moiſt loams, and in ſandy loams, or ſands, with a ſtratum of clay beneath. Their tap-roots require ſome depth to ſtrike in, their growth is quickeſt where the ground is free,* but in ſtubborn clay is very ſlow till their roots have penetrated far; then they begin to thrive and produce the tougheſt and moſt laſting timber.

A famous inſtance of longevity, durability, and the amazing bulk they will attain in ſoils which ſuit them, has been particularized in the Langley Oak. †

A living and unexampled proof of the rapidity of their growth, when aſſiſted by culture, may be ſeen at Stratton in Norfolk; where an Oak, planted by Mr. Marſham in 1720, is now above eight feet round at fourteen feet from the ground; but this had the advantage of manure, tillage, and other judicious treatment, to which its haſty progreſs may be attributed, and to which few planters can or will attend.

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* Kennedy, in his treatiſe on planting moors and commons, ſays, (vol. I. p. 127) "That in black mooriſh-land, where long heath "grows, oaks thrive faſter, and make finer ſhoots, than in any "other ſoil."

What pity then it is but all ſuch moors were planted!

I have ſeen oaks of large ſize protrude themſelves from fiſſures of rocks, where no ſoil appeared. To clothe the naked crag with timber, merits our warmeſt praiſe.

† This tree was perfectly ſound at 300 years old.

The growth of middle-aged oak is generally from one inch 1-third, to an inch in circumference yearly; between its twentieth and its hundredth year, it ſometimes exceeds this meaſure; and in its ſecond century falls within it. But as the ſolidity of the ſhaft conſiſts leſs in its length, than in the ſquare of its diameter in the girting place, a ſmall addition to the diameter there enlarges the ſquare abundantly. Wherefore, though the circumference from the hundredth to the hundred and fiftieth year, may not increaſe ſo faſt as it did to the hundredth, the ſolid contents will be increaſing faſter; for as the ſquare of the diameter* 40 = 1600 exceeds the ſquare of 24 = 576†, ſo will the contents in the 150th year exceed the contents in the 100th, when its annual enlargement was 1-8th of an inch greater.

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* Forty inches was the diameter of Fyfields Oak, in its 150th year - - - 40

X40

1600 = Its ſquare.

† Twenty-four inches diameter of the ſame in its 100th year,

24

X24

576 = Its ſquare.

Under the deſcription of Fyfields Oak, I have endeavoured to prove, that this timber, though not ſo quick of growth at firſt as the ſofter woods, will pay ample intereſt to ſuch proprietors as give it time to come to maturity. For oaks in the end will exceed in magnitude ſuch trees as outgrew them in their infancy; the period of the growth of the latter being over, before the oak begins to extend its timber through its limbs, it is then that it increaſes rapidly; it is then that it pays for ſtanding; it is then that it makes amends for ſlow advances in the early ſtages of its progreſs; producing more timber in the laſt twenty years, than it did in the whole firſt century; and (quite the reverſe of elm) the larger and more crooked the limbs are, (however ſhort the bole) the more valuable is the timber.

Tall ſtraight oaks, when of full ſize, are beautiful objects, whether ſingle or in woods. They are requiſite for beams, for kelſons, ſtern-poſts and plank-ſtocks; and great is the conſumption of the latter; for ſhips are planked both within and without with oak, ſave beneath the light water-line, where beech performs that office. The growth of oaks like theſe is the chief aim of the generality of planters; and ſeems to have been the immediate deſign of the ſurveyors of Dean Foreſt. Should their plan be adopted,* the trees will draw one another up ſo faſt, that ſcarce a crooked one will be found in 18 thouſand acres, ſave round the out-ſkirts; and the ſoil will be full of ſtubs, which, as oak robs oak, muſt check the growth of the ſurviving timber.

Planters of all kinds (as before obſerved) ſhould attend to the uſes to which their timber may be appropriated. Incloſures made at Government's expence, therefore, ſhould be nurſeries for timber adapted to government purpoſes. The marine, being the firſt and principal object, ſhould in the firſt place be provided for. Trees diſperſed on open commons and extenſive waſtes, have hitherto produced the choiceſt timber; and though the returns of the foreſts have of late years, through miſmanagement,

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* They propoſe to turn ſods upſide down, at three feet apart, to plant one or two acorns in each ſod with a dibber, taking out at the end of ten years every other tree; at the end of fifteen years every other tree again, to leave them at twelve feet apart;[c] at twenty-five years growth, to fell 132 trees on an acre; at thirty-five years growth, to leave the trees at twenty feet apart; and at forty-five years to leave 75 upon an acre, &c. &c.

[c] This is evidently a miſtake; for to ſet them at twelve feet diſtance from each other, ſeven out of eight muſt be cut down. The whole indeed is incomprehenſible, for after ſetting the trees at 12 feet apart, it would require a conjuror to ſet them at 20 feet.

management, been very ſcanty;* yet they have conſiſted of ſuch valuable knees and crooks as the merchants would have found it difficult to have furniſhed. And if no proviſion be made for growing ſuch in future, we, like the French,† ſhall be reduced to the neceſſity of uſing iron-braces inſtead of timber-knees.‡ In the preſent ſcarcity of theſe valuable articles, it is not only the buſineſs of the ſurveyors, but the duty of every member of the community, who is bleſt with the means, to try at their production. The French have attempted it by ſuſpending weights to the heads of ſlender ſaplings, bowing them haſtily towards the ground, which is not only an expenſive, but inefficacious method, for it injures the plant by ſtraining the bark and rupturing the ſap-veſſels. Let us take nature for our guide, ſtudy her means, and imitate her ways.

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* Two thouſand loads yearly on an average of the laſt 20 years. The conſumption of the docks is 25,000 loads.

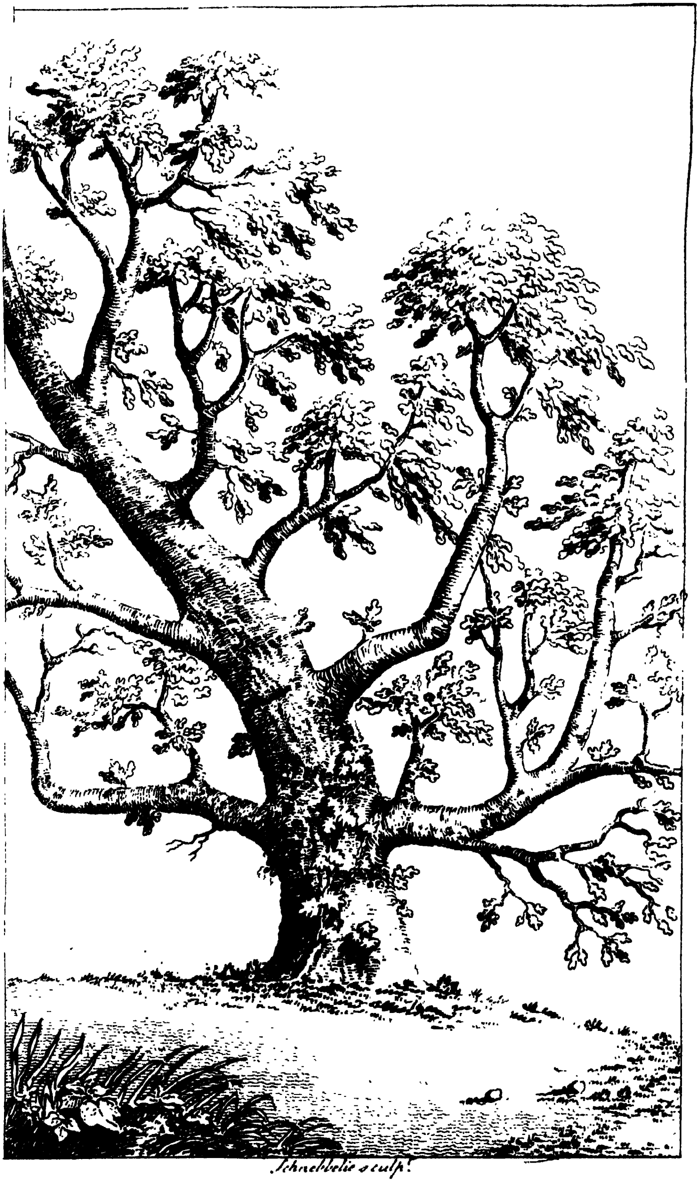
† Vide Falconer's Marine Dictionary—article Knee.

‡ The contractors for India ſhips have been already neceſſitated to uſe iron braces, through the ſcarcity of large knees, and in trading ſhips they are found convenient, as leaving more room for the freight; but in a man of war, the ſolidity of the timber knees adds greatly to the ſtrength and ſtability of her ſides, enabling them to reſiſt the batteries of the enemy for longer continuance, and preſerving the men in great meaſure from the deſtructive power of ſplinters.

Whoever traverſes a foreſt, with the eye of curioſity awake, muſt remark, that almoſt every thorn becomes a nurſe for timber. Acorns, or beech-maſts, or ſometimes both, dropped by birds or ſquirrels, vegetate freely under the ſhade and protection of the buſhes, till they riſe above the bite of cattle. Small groupes and ſingle trees are thus produced; their guardian thorns when overpowered periſh. Then, having open ſpace for their roots to range in, their growth becomes rapid, their bodies bulky, their limbs large and extenſive; cattle reſort to them for ſhelter, enrich the ground with their droppings, the timber derives advantage from the manure, becomes productive of knees, crooks, and compaſs pieces, the chief requiſites in naval architecture. Vide No. I.

If lords of manors, and men of landed property, would purſue the hint which nature here throws out, and employ the aged and infirm, to collect and dib among the thorns (with which the waſtes, furzy commons, and aukward corners of their eſtates abound) ſuch tree-ſeeds as the ſoil is beſt adapted to; how ſoon would the face of the country be improved! What varieties of flouriſhing trees would in a few years preſent themſelves! What proviſion made for poſterity hereafter!

Plate I.



Schnebbelie sculpt.

Parks and pleaſure-grounds might be rendered enchantingly beautiful, by clumps of quickſets, black-thorns, hollies, &c. interſperſed here and there for the protection of acorns,* purpoſed to be ſown among them. Under their umbrage, oak-ſaplings, which delight in ſhade, would thrive exceedingly; be ſafe from the brouze of cattle, without the expence of fencing, and the lawns become bounded with ſtately timber, not only a laſting but improving ornament to future generations.

Why ſhould we truſt to chance to ſow our woods? What would be the expence of a buſhel or two of acorns ſet by hand a year before each cutting? when a man might paſs between the ſtubs, planting them in vacant places at ten or a dozen ſteps apart; at ſuch diſtances they would have room to grow without annoying the underwood, till their own value made amends for its deficiency.

Cloſe planting I profeſs myſelf no friend to; oaks drawn up like hop-poles, excite my indignation;

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* Some years acorns are ſcarce and difficult to be got, but as ſuch years of ſcarcity generally ſucceed to years of plenty, numbers of ſeedling oaks may be drawn from wheat-ſtubbles in the neighbourhood of woods, which if taken up careful and planted the ſame day, will grow readily and gain a year.

for it is with planters as with gardeners, the one thins not his trees, nor the other his fruit, till the miſchief has been done; we ſuffer them to remain and impair each other, before we have reſolution to diſplace them; and at laſt perform the buſineſs ill or ſparingly;* not reflecting, that one prime oak, or one prime beech, is worth a ſcore of ſtarvelings. Vide Mr. Nichols's Account of a Plantation in New Foreſt.

In plantations thus begun, however diveſted of incumbrances in the advanced ſtages of their

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* I remember a circular thicket of oaks on an eminence, which had at a diſtance the moſt pleaſing effect, aſſuming the appearance of one immenſe round head, reaching almoſt to the ground. On a nearer approach, the ſtems of the cluſter became viſible, but ſtood ſo thick, that like the famous Indian Fig, they ſeemed to form a congeries uniting in one trunk. When amongſt them, however, they were from 4 to 6 feet apart, drawn up to the height of 50 feet or more, but ſo ſlender as not to exceed 6 inches diameter in the middle of their ſhafts. They were great favourites of their owner, who ſet the acorns whilſt a boy under the direction of his father, in whoſe time they had been thinned twice, and once by himſelf afterwards; on my lamenting that they had ſo little ſpace alloted them, he acknowledged more room would have been better, and in a few years after thinned them raſhly, taking away two-thirds at once, which he ſold for 7s. a piece, leaving the beſt, as he thought, to improve. But theſe, diveſted of their ſupporters, bent like reeds before the wind, and after every ſudden guſt, reverberating forcibly, claſhed their branches one againſt the other till daſhed to pieces, thoſe in the outer ring alone eſcaping. This hopeful grove of plants thus periſhed at half growth for want of early thinning.

Schnebelie sculp

J. R. Schellenberg sculp.

growth, few if any knees or naval crooks will be found, except upon their borders; we muſt look for theſe either in ſingle trees, like No. I. in ſmall groupes or in hedge-rows. In groupes, one or other often gains the maſtery, as repreſented in No. II. or III. and forces the reſt to bend forward till they have room for aſcent. Trees, when few in number, enjoy a liberty nearly equal to ſingle ones; each has a ſpace where its roots may draw nutrition; and as theſe and the branches uſually follow the ſame direction, the leading roots of the inferior trees will tend outwards, and finding nothing to obſtruct their paſſage, will furniſh ſupply ſufficient to keep them thriving, notwithſtanding the ſuperiority of their antagoniſts.

In this age, when our ſtock of timber is ſo very low, and our impatience ſuch, that we cannot wait till the ſmall quantity that is left attains maturity, we muſt not expect to find many capital crooks in branches like thoſe of the Langley Oak, but muſt produce them in the ſtem or bole of the tree;* which can only be done by a regular and conſtant oppreſſion; the effect whereof may be ſeen in figures No. II. and III. and in hedge-rows where the timber ſtands thick, as No. IV. repreſents. The centre ſtick of the three, growing behind the others, and not finding room to ſpend its ſap by riſing betwixt their tops, made its way out to the ſun and air, as appears in the draught annexed, forming a capital knee and valuable crook above it. In theſe inſtances we find a plain and uſeful leſſon, *viz.* that trees, impelled to a certain direction whilſt young, will continue growing in the ſame direction as long as they exiſt. Their natural tendency is doubtleſs towards a perpendicular; but if conſtrained to change this diſpoſition early, they will proceed horizontally till they [illegible] room to aſcend freely; and though they then immediately riſe upwards, the curve they have taken will in great meaſure be preſerved, even when the oppreſſors which cauſed it are no more. Hence it is manifeſt, that any quick growing trees of ſmall value, may be uſed as inſtruments for forcing ſeedling oaks out of their upright line. Cuttings of coppice withy* will, by the freedom of their growth,

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* Deformity in a tree, like the ſame defect in the human body, deviates from the line of beauty, but national intereſt requires it to be promoted, that we may not, like our neighbours, be compelled to ſubſtitute iron braces in the room of knees and crooks.

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* It may be obſerved, that I no where recommend the beech as a companion to the oak. It is in fact too mighty for it. When one ſtands near the other, the tree of the firſt conſequence yields to the quicker growth of its rival, and comes to little.

Schnebbelie sculpt.

Schnebbelie sculpˢ

(as repreſented No. V.) overpower the ſaplings, bearing them down almoſt to the ground for a time, and the purpoſe being effected, may for relief of the oaks be cut down as often as requiſite, till, as they gain power, the withies in their turn give way. Plants like theſe, which extract nutrition of a different nature, though they promote a crook, will not ſtarve or check the oaks beneath them.

Trees growing out of a bank frequently take a favourable turn like No. VI. Such are accepted by the king's purveyors as compaſs pieces, which gain admiſſion into the dock-yards, though of leſs dimenſions, and at a higher price than ſtraighter timber. It may be proper therefore, in new incloſures, to throw up the banks high and broad, to plant quickſets on the outer ſlope, on the top withies, and at due diſtances near the baſe of the inner ſlope to dib in acorns; which in their future growth muſt incline forwards to avoid the projecting withies, and be ſome years before they can attempt a perpendicular. In ſuch caſe the crook will be near the butt in the ſtouteſt part of the timber, and the curve, thus formed in infancy, will retain its ſhape as long as the tree endures.

Having now ſhewn the means by which naval-crooks may be obtained at an eaſy expence; I proceed to recommend the growth of oaks, in preference to other timber, to every one who is poſſeſſed of ſoils ſuited to their production. Thoſe who have waſtes and furze-grounds thinly ſcattered with trees, and of ſmall preſent value, may, by attention to the hints here given, render them not only of great conſequence to themſelves and families, but highly beneficial to the ſtate.

All who with generous views, in this the time of ſcarceneſs, warmly apply themſelves to raiſing oaks for publick good, giving up preſent advantages for their deſcendants' future gain, deſerve a civick crown. In ſuch attempts, let every liberal mind enjoy its own ideas; ſome following one, and ſome another way. Then, whether we try ſaplings from the nurſery, for open groves; ſow acorns mixed with nuts for coppices, or ſet them among buſhes, it ſignifies little, ſo we do but plant, protect them from the bite of cattle, and thin them often, that they may not croud and ſpoil each other. Defects of which inſtances have been given, that the like in future may be avoided.

I acknowledge to have thought with Mr. Miller, that oaks for timber ſhould be raiſed from acorns ſown upon the ſpot, rather than by tranſplantations;

that method, therefore, has generally been my practice. Mr. Marſham now indeed has nearly made a convert of me. That gentleman's ſucceſs almoſt exceeds belief; but he is bleſſed with a happy ſoil, and no one more deſerves ſucceſs than he does.

For ſowing acorns, the inverted ſod of the ſurveyors ſeems not equal to Mr. Pavier's method of preparing the ground by bringing it into good tilth. I would add, dung it well for wheat, throw it up into ridges, ſow hazle-nuts, ſloes, haws, holly-berries, aſhen and maple-keys, broad-caſt with the wheat, and dib in acorns at ten or twelve feet diſtance, along the mid-ridges where the ſoil is beſt. At reaping-time, leave the ſtubble long to ſhelter the ſeedlings, and in the ſpring following, ſcatter ſome clover ſeed over the ground; much of it will grow to ſhade and protect the oaks when the ſtubble rots away. Patches of clover or wild vetches meliorate the ſoil, and promote the progreſs of the ſeedlings rapidly. Theſe, as they advance, may be thinned and trained either to crooks or upright ſtems, as beſt ſuits the planter's purpoſe; for oaks, whilſt the bark is ſmooth and white, may be diveſted of their ſtraggling ſhoots without injury, for the wounds not being large will ſoon heal over, leaving neither blemiſh or dead knot behind.

For planting, the ground ſhould be well trenched, and the oaks, if drawn from a warm nurſery, muſt be ſet thick at firſt; but as ſoon as they appear in a growing ſtate, ſhould be thinned every three or four years at furtheſt, till ſet at twenty or thirty feet apart; even theſe diſtances are ſcarce ſufficient for naval timber. Such as are taken out may be planted in vacant ſpots elſewhere; and if dug up carefully, there will be little danger of their failing.

AGRICULTURE, the life and ſoul of every ſtate, hath been wiſely and liberally encouraged by the *Bath Society*, under whoſe auſpices it haſtily advances towards perfection.

PLANTING, whilſt it does not interfere too far with their chief object, lays the next claim to favour. Under the like ſanction, methinks I already ſee our timber flouriſh. Honorary rewards incite the nobleſt minds to action, emulation of courſe enſues, and that ſpirit once abroad, the work is half performed.

From the ſmall freeholder, little can be expected ſave the raiſing an orchard for his own convenience. It is to the owners of extenſive property, that we are to look up for grand improvements. The growth of timber ſolely reſts with them. The preſervation of their own families, the welfare of the community, nay, the very exiſtence of their country, as a maritime ſtate, depends upon their ſpeedy exertions. The devaſtation which prevails in our woods, threatens their total deſtruction.*—Without forbearance, the ſmall ſtock that is left will preſently be exhauſted. Britiſh timber will no longer ride triumphant on the main. The docks muſt ſtand indebted to foreign countries for ſupply. Our ſhips will be of ſhort duration, and our expences wonderfully enlarged.

To conclude:—The exigency of the times ſo immediately demands attention, that had I the magick power of perſuaſion to reach the heart of every thoughtleſs land-owner, I would never ceaſe exclaiming, O my countrymen! my countrymen! let us no longer yawn in indolence, leſt a fatal lethargy enſue. No longer let us truſt to chance, to birds, to ſquirrels, to be our planters, but beſtir ourſelves. Let us inſtantly refrain from felling half-grown trees; employ the poor and needy to ſcatter acorns with a liberal hand; beſeech the Almighty of his goodneſs to proſper our endeavours; then we may live to ſee our woodlands once more crowned with naval timber, our landſcapes ſkirted round with lordly oaks, and our eſtates deſcending to poſterity, with the ſure and glorious proſpect of enriching and protecting their poſſeſſors!

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* If there be not 1-5th part of the naval timber that there was 50 years ago now left, and the annual conſumption in the dock-yards, be 25,000 loads, excluſive of the ſhips built for government in private yards, together with the increaſing demands for commerce, Eaſt-India ſhips as big as men of war, &c. &c. what muſt be the conſequence? Unleſs ſome check be given to our imprudence, another twenty years compleats our ruin.

I am, &c. &c.

Boſſington. T. SOUTH.

ADDITINOAL LETTER TO THE SECRETARY.

[*The Subject announced in the following Letter, is of ſo intereſting a Nature, as to beſpeak the Attention of Country Gentlemen at large. And the Work preparing for the Preſs, by ſo able a Hand, cannot fail of being impatiently expected by the curious in Wall-Fruits.*]

SIR,

BY many of your obliging letters, I have been invited to communicate to the Society further accounts of my rural labours than thoſe I have already troubled you with. Such have been confined within the narrow compaſs of twenty acres of meadow, ſome ſcattered plantations, an acre and a half of garden-ground, and the production of the Peach and Nectarine.

The improvement of the former has been amply enlarged upon by abler hands. The culture of the latter ſeems to have been either little attended to, or imperfectly underſtood. That trees, with ſkilful management, will produce fruits ſuperior in ſize, beauty, and flavour, to thoſe of the ſame ſpecies in an indifferent ſtate of culture, is a fact too well known to be controverted. When we meet with aqueous inſipidity, where vinous juices ſhould prevail, our climate is condemned as unfavourable, and the ill conſequences of our own miſconduct, negligence, or ignorance, are attributed to its want of benignity. Bad ſoils, and wet ſeaſons, make indeed great difference in the flavour of their productions; but the former may be corrected, and the latter ſo ſeldom happens in the extreme, that nine years out of ten, I truſt we can produce both the peach and nectarine within this kingdom, equal, if not ſuperior, in quality to the boaſted produce of our neighbours on the continent.

I dare not riſk an aſſertion ſo oppoſite to the general opinion of my countrymen, (who think they muſt travel ſouthwards to taſte theſe fruits in perfection) without producing teſtimonies to my credit. *I therefore refer to Sharpe's Letters,* already* in

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* "Whilſt I was in England, I never heard the words Northern "Climate pronounced, but they conveyed to me an idea of barrenneſs and imperfection. I had always conceived, that vegetables and garden fruits obtained a flavour in the more Southern "climes, unknown to the latitude of 52. But to my great ſurprize, I do not find that they are equal in taſte and ſweetneſs to "thoſe which grow in our gardens, and what is ſtill more ſurprizing, few of their fruits excel ours; I believe none, except "their water melons, their grapes, and their figs. If they have not "peaches to be compared to ours, I preſume it is owing to the "violence of the ſummer ſuns, though poſſibly it may ariſe from "their ignorance of cultivation in Italy.[a] A certain noble of Venice, well known in the polite world for his attachment to the "fine arts, has procured a ſkilful gardener from England, within "theſe few years, in hopes of improving the culture of his garden; I converſed with this gardener, whom I found under a "ſtate of diſcouragement and deſpair. He told me he had not ever "taſted a peach in Italy of a true flavour, and he believed he "never ſhould; for that he was thwarted and obſtructed by the "other gardeners in his attempts to reform their practice; that he "had no authority over them, but was confined to his own proper "department, which he told me would anſwer but very little "purpoſe."

Sharpe's Letters from Italy, dated Naples, Nov. 1765.

Peaches in Rio de Janeiro [almoſt under the Tropic of Capricorn] are meally and inſipid. Cook's Voyage, by Hawkeſworth, 2 vol. p. 33.

[Mr. S. though handled roughly by the writer of the Sentimental Journey, poſſeſſed a ſoul congenial to his own. Had that

[a] Perhaps from both cauſes.

celebrated

in the hands of the publick, and to a private letter *or two incloſed, in confirmation of what is ad-*

celebrated author ſeen him (as I did) perform the following office of humanity, he would have treated him more tenderly, and for his virtue's ſake, have buried his foibles in oblivion.

ANECDOTE.

Mr. Sharpe, when he reſided in Surry, uſed frequently to hunt with Mr. Northey's harriers. I was riding with him by the ſide of them one day, when a heedleſs ſervant galloped in among the pack, kicking one of them to a diſtance; the poor animal yelled woefully; Mr. S. ſtopped immediately, and ordered his groom to examine the hurt; a leg was broke in two places. He himſelf, tho' of the firſt eminence in his profeſſion, alighted, took the dog in his arms, ſat down upon a mole-hill, diſpatched his ſervant to a diſtant juniper buſh to cut ſplinters, took off his own garter, ſet the poor creature's fractured limb, bound it up with the utmoſt tenderneſs, laid it upon his own great-coat, on the pummel of his ſervant's ſaddle, directed him to walk his horſe gently with it to Epſom, told him the poſition it ſhould be confined in, and that it ſhould be fed by hand till a callous was formed, which being readily complied with, (as it was a favourite dog of Mrs. Northey's) it ſoon grew well, and before the hunting-ſeaſon was over, followed the ſport with its wonted keenneſs.

Though fond of the diverſion, and impatient of delay when the hounds were running, I tarried on this occaſion, and was eye-witneſs to the ſcene, which I think preponderates in the ſcale of humanity, before either of thoſe famous ones of the Monk and his ſnuff-box, the dead aſs, or weeping Maria, ſo inimitably wrought up by Sterne himſelf.

As Mr. Sharpe was well known at Bath, it is with pleaſure that I ſend thither this tribute to his memory.

T. SOUTH.

The above anecdote, though not AGRICULTURAL, will not be unpleaſing to the lovers of humanity in that line.]

vanced, and from long obſervation can venture, Sir, to aſſure you, that a due ſouth aſpect, hitherto thought abſolutely neceſſary to bring theſe fruits to perfection, often proves injurious to our choiceſt peaches, and cauſes our nectarine trees to caſt their fruit unripe.

In cold wet ſummers, France may have the advantage of us, but in warm and dry ones, I am confidently perſuaded to the contrary. The unuſual heat of the 2d, 3d, and 4th of Auguſt 1788, affected my fruit on the ſouth and ſouth-weſt walls, in ſuch a manner as to alter its very nature, ſo that the Montabon, the Nobleſs, and other peaches, uſually juicy, rich and vinous, became in ſuch aſpects, that ſummer, dry and mealy. Hence I rationally draw this concluſion, that our climate, however it may have been raſhly condemned, is more appoſite to the production of theſe fruits, than any other whatſoever, unleſs perhaps ſome diſtricts of Perſia, to which they are indigenous, may prove an exception. Above thirty years experience and cloſe attention to their culture, warrant ſuch a concluſion.

The unprecedented ſucceſs with which my labours have been crowned, induces my friends to be ſolicitous, that the knowledge I have obtained, may not die with me. In compliance with their requeſt, I have begun preparing a communication of my practice to the publick; and in order to qualify myſelf to throw the ſtrongeſt light poſſible on the ſubject, have ſtocked my garden with every ſpecies or variety of theſe fruits now cultivated either in France or England. Such another collection is not, I believe, to be found in this country. The generality of fruits have long been familiar to me; of the particulars hitherto unobſerved, many are in a train for bearing next ſummer, and the reſt the year following:—when, having grown them all in the ſame kind of ſoil, and under one and the ſame mode of treatment, it will be eaſy to determine whether the varieties pretended to, really exiſt, to mark the ſpecifick differences of one from the other, to judge of their reſpective merits as to ſize and flavour, ſo as decidedly to point out thoſe which deſerve future propagation, from thoſe which, being comparatively worthleſs, ought to be condemned to perpetual excluſion.

Having made this ſingle branch of horticulture my ſtudy, both in theory and practice, for thirty years and upwards, and having proved, to the aſtoniſhment of many, that wall-trees will perfectly conform to the will of the pruner in the due arrangement of their branches; in their general reſemblance to each other; in an aptitude to furniſh the wall in *every part with the richeſt garniture of leaves,* bloom, and fruit, in their reſpective ſeaſons; I think I may, without preſumption, attempt to inſtruct others how by the ſame means they may effect the like purpoſes. To do this methodically, I ſhall begin with trees in their infancy, advance gradually through the ſeveral ſtages of their progreſs, and accompany them till they arrive at maturity. To point out the miſtakes that ſome have fallen into; to ſhew the defects of modern practice; to contraſt imperfect with perfect figures, will require copper-plates exhibiting their varied appearances in the pruned and unpruned ſtate; by which an accurate obſerver may, with the aſſiſtance of the remarks accompanying them, eaſily attain a knowledge of the ſubject ſufficient to enable him to manage his own wall-trees, and obtain ſuch fruit as he ſeldom ſees elſewhere. A new field of innocent and uſeful amuſement will here be laid open for the country gentleman to employ his leiſure hours in rural retirement, and to fill up the intervals of ſtudy, to the reſident clergy, in a way by no means unbecoming their function. Mr. Laurence, rector of Biſhop's Weremouth in Durham, the beſt pruner of his time, recommends the practice to his brethren as a recreation that will fill up thoſe little parentheſes of of their lives, which commonly go for nothing, in an intereſting and pleaſurable manner.

*Having read moſt of the books hitherto pub-*liſhed relating to this art, and not finding one that teaches the true rudiments, there ſeems to be an opening left for a work of this kind, which I have not in contemplation only, but in ſome forwardneſs, as you will perceive by the drawings ſent herewith.* Many of them being in a rough unfiniſhed ſtate, ſhall I trouble you with laying them before the artiſt who reduced the oaks, to know whether he will copy and improve ſome particulars, and ſhade and finiſh others, according to the directions accompanying them? In caſting your eye over the drawings, with the few explanations which attend them, you may give a gueſs at the deſign and utility of the work. If you wiſh to communicate them to ſome few of the ingenious members of your ſociety, you have my permiſſion. If in your united opinions, a work

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These drawings are in themſelves maſterly, and the artiſt now employed in finiſhing them is a man of firſt-rate abilities. The teſtimonies to the ſuperior excellence of the author's FRUITS, are the moſt reſpectable and full. W. M.

The work is to be entitled, "The Gentleman's Recreation in the Fruit Garden; or, a Treatiſe on the Culture of Peaches and Nectarines; embelliſhed with plates, and notes explanatory to a regular ſyſtem, for the training, pruning, and management of Wall-trees, from their infancy to advanced old age: with directions how to obtain a conſtant even crop of the moſt delicious fruit; with thoughts on the production of flavour; cures for the ſeveral diſeaſes fruit-trees are prone to; the prevention of blights, deſtruction of vermin, and preſervation of the fruit in full beauty, till arrived at the height of perfection."

of this nature may prove worthy the patronage of the publick, it will excite a glow of ſpirits ſufficient to ſupport me through the labour of a quarto publication, intended to make its appearance in 1793, if nothing happen to prevent it. Improvements in agriculture, under the auſpices of the Society, may admit ſome intervals of leiſure, for attention to the luxuries of the wall. I intend therefore to beg the favour of the Society, to add a copy of the work to their collection; and if it ſhall be found to merit approbation, to honour the author with giving it their ſupport. I am, Sir, &c.

Mr. William Matthews. T. SOUTH.

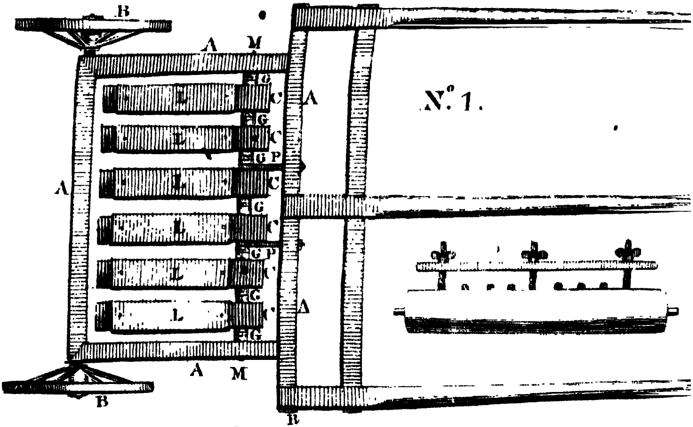
[N. B. The foregoing familiar Letter, &c. &c. were not ſent by the Author for publication in this volume; but he will pardon the freedom of the inſertion, in proportion as it muſt give pleaſure to the publick. And to announce a work to which the publick favour will become due, is compatible with that advancement of ſcience, which this Society profeſſes.]

ARTICLE II.

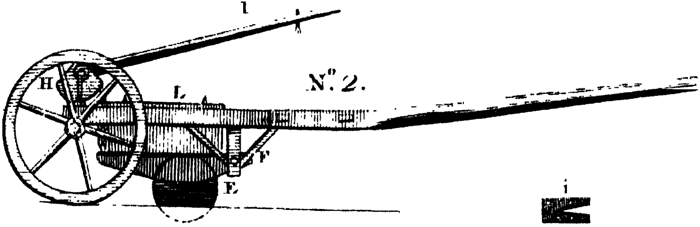
A Deſcription of the Inſtrument, called a Sward-Cutter, *invented by the Hon.* Robert Sandilands *ſome time ago, now much improved, particularly with regard to the Expence, it being reduced from 15l. or 16l. to 5l. or 6l.*

FIG. I. No. 1, A. A. &c. a ſquare frame three feet four inches from the fore to the hind part, by four feet three inches, the breadth of the

No. 1.



No. 2.



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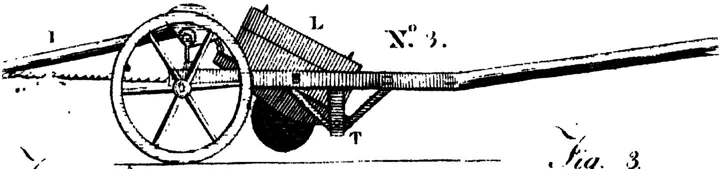


Fig. 1

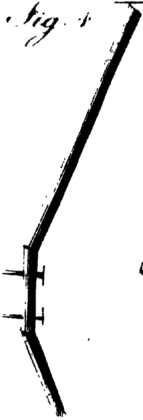


Fig. 2.

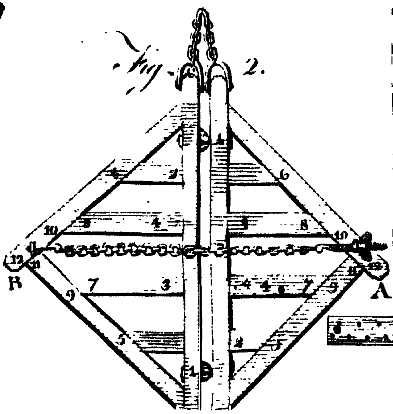
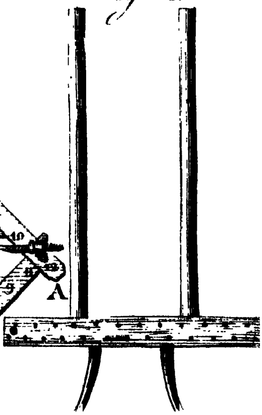


Fig. 3.



the machine within ſide; the timber (when of fir) four inches ſquare, placed on two wheels B. B. three feet diameter, a little more or leſs, (the old fore-wheels of a chaiſe may anſwer the purpoſe) to ſupport the hind part of the machine.

C. C. &c. ſix ſtrong pieces of wood, called bulls, three feet long, five inches and a half broad, the thickneſs ſix inches at E, No. 2, and tapering to three inches at F. Into theſe bulls are fixed the cutting wheels, which are iron, 13 inches diameter, 3-quarters of an inch thick at the centre, about an inch diameter, for piercing holes to fix the iron axles in; from that they are to be of ſuch thickneſs, as to allow the edges to be well ſteeled. Theſe wheels are fixed by two bolts going through the bulls, with eyes on one end, for the axles of the wheels to run in, and nuts and ſcrews on the other, to make them very firm by, and ſunk in the bulls, to prevent their interfering with the weights L. reſting on them.

G. G. in No. 1, are hollow pieces of wood, called *thorles*, each three inches and a half long, which incloſe the bolt M. and keep the bulls C. C. at their proper diſtances, but may be made longer or ſhorter at pleaſure, as the ward requires to be cut in larger or ſmaller pieces. They are in two pieces, and bound together, and jointed by a ſtrap of leather or cord, which allows them to be readily changed, when the cutting wheels require to be kept at more or leſs diſtance.

The iron-bolt M. No. 1. goes through two pieces of wood or iron, ſeven inches long, clear of the wood, ſupported by iron ſtays, fixed to the frame, and through all the bulls, as at T. No. 3, it requires to be ſtrong, as the draught of the horſes terminate there.

H. H. No. 2 and 3, a cylinder or ſegment of wood, ſeven inches diameter, called a *rocking-tree*, which goes acroſs the frame, and moves on the pivots fixed into it, one at each end, ſupported by an iron-bolt, or piece of wood morticed into the frame, eight inches high, as appears in No. 2 and 3, to which ſix chains or ropes are fixed by hooks, at different diſtances, as you want your cuts, at 9, 8, 7, or 6 inches from one another, and are joined to the end of each bull, in which the cutting wheels run; ſo that when the rocking tree is turned about by the lever I. fixed in the middle of it, all the bulls, with their cutting wheels, are raiſed out of the ground at once, as in No. 3, by which means the machine may be turned, or moved from place to place with great eaſe, without any danger of ſtraining the wheels..

N.B. The rocking tree is not delineated in No. 1, in order that the plan of the frame may be more eaſily underſtood.

L. L. No. 1, 2, 3, are weights of free-ſtone, 26 inches long, ſix inches broad, the under one four inches thick, the upper one of the ſame dimenſions, and three inches thick, which will weigh (according to the gravity of the ſtone) about four ſtone the under, and three the upper, all of them having two holes in them, thro' which iron ſpikes, firmly fixed in the bulls, paſs, in order to keep them ſteady.

When the ground is eaſily cut, the under ſtone, of four ſtone weight may anſwer; when more difficult, the other ſtone of three ſtone weight may be added, ſo that every wheel may have ſeven ſtone weight upon it, which has been found ſufficient for the ſtiffeſt land and taugheſt ſward the machine has ever been tried on. Caſt-iron weights will anſwer fully better, but are more expenſive, which the inventor wiſhes by all means to avoid.

The lever I. No. 2, 3, which ought to be five feet long, muſt have a ſliding rope on it, fixed to the back part of the frame, ſo that when the cutting wheels are all taken out of the ground three or four inches, by the rocking tree's being turned partly round by the lever, the rope is then fixed to it, by putting a loop at the end of the rope over the pin R. No. 3, (it ought to be placed three feet four inches from the extremity of the lever I.) which keeps all the cutting wheels out of the ground till the machine is turned, and then, by moving the loop of the pin, it ſlips back towards the frame, and the lever is gently let back to its place, as in No. 2, by which the cutting wheels are put into their former poſture, by the weights fixed on the bulls in which they run. The levers may be made of good tough aſh.

P. No. 1, a ſmall bolt of iron, with a hook on one end of it, (one is ſufficient) to ſtrengthen the bolt M. to be hooked on the centre of it, and joined to the frame by a nut and ſcrew. —

The grooves, in which the cutting wheels run, may be covered below at the hinder part with a plate of thin black iron, ſix inches long, three inches broad, having a ſlit in it where the wheels run, to prevent (if found neceſſary) any graſs, weeds, or ſmall ſtones, from filling the grooves, and clagging the wheels; the form of which is ſeen at the letter *i*.

To the frame, as ſeen at No. 1, are fixed (for a double-horſe Sward-cutter) three ſhafts, as in a waggon, of ſuch length, ſtrength, and diſtance from one another, as any workman may think proper.

For a ſingle-horſe Sward-cutter (which has only four cutting wheels) a pair of ſhafts are uſed, and may make the two ſides of the frame without any joinings. The width of the frame, in proportion to the double-horſe Sward-cutter, is as four to ſix.

It is recommended for a double-horſe Sward-cutter to have eight bulls and wheels, that when it is uſed to reduce hard cloddy ſummer fallow, or land for barley, before the laſt furrow, or even after it, the whole weight, 42 ſtone, employed in ſward-cutting the ſtiffeſt land and tougheſt ſward, may be applied to the eight bulls then at ſix inches from one another: the four ſtone weights to be applied to ſix of the bulls, and two of the three ſtone weights to each of the additional bulls, which is thought will prove a ſufficient weight for the purpoſe, and will effectually prevent a clod, at any time, of more than ſix inches broad, from eſcaping being broke to pieces.

In the ſame manner, a ſingle-horſe Sward-cutter may have ſix bulls for the above-mentioned purpoſe;

poſe; the 28 ſtone belonging to it, divided thus: the four ſtone weights to four of the bulls, and two of the three ſtone weights to each of the additional bulls. It was thought better to be rather minute here, than trouble the perſon employed in uſing the ſward-cutter with any calculations.

That the inſtrument may come as cheap as poſſible to the publick, the inventor is of opinion, that the expence of the two wheels and the iron axle (which is conſiderable) may be ſaved, by joining ſtrongly to the frame at S. No. 3, a piece of wood with a little curve at the extremity of it, reſembling the foot of a ſledge, formerly much uſed in Scotland, to carry in the corn from the field; the part of it reſting on the ground being kept 18 inches (the half diameter of the wheels) from the frame, by a ſtrong ſupport of wood.

As the two outer bulls next the frame are apt to get under it, ſo as to prevent the cutting wheels from being taken out of the ground, a thin ſlip of iron fixed to the inſide of the frame, nearly oppoſite to the back end of the bulls, of convenient length, will be found neceſſary.

A ſhort Account of the uſes of the Inſtrument called a Sward-Cutter, *with the advantages attending it, and the manner of uſing it.*

THE original intention of this machine was to prepare old graſs-ground for the plough, by cutting it acroſs the ridges, in the beginning of, or during winter, when the ground is ſoft, in order to anſwer all the purpoſes that Mr. Tull propoſed by his four-coulter plough, ſo ſtrongly recommended by him for bringing graſs-ground that has been long reſted into tilth. This the Sward-cutter has been found to do, much more effectually and expeditiouſly, as Mr. Tull's plough, with four coulters, cut the ſward in the ſame direction with the plough, and is liable, from every ſtone, or other obſtruction any of the coulters meet with, to be thrown out of its work altogether, or the inſtrument broke, to which the Sward-cutter, conſiſting of four, ſix, or more cutting wheels, is never liable, from their being entirely independent of one another, cutting the ground acroſs the ridges before plowing, and rendering that operation eaſier to two horſes than it would be to three without its being cut. The furrow being cut acroſs, falls finely from the plough in ſquares of any ſize required, not under ſix inches, in place of long ſlips of tough ſward, ſeldom and imperfectly broke by the four-coultered plough.

Any perſon who reads Mr. Tull's deſcription of his four-coultered plough, and what he propoſed by it, will ſoon ſee the great advantage the ſward-cutter has over it, in producing the deſired effect of bringing old reſted graſs-ground into tilth; an object univerſally allowed to be of no ſmall importance to agriculture.

This inſtrument is very fit for preparing ground for burnbating, as it will ſave much hand-labour.

It may be properly uſed in croſs-cutting clover, of one or two years ſtanding, to prepare the ground for wheat, if the land be ſtiff and moiſt enough.

It may be applied to cutting and croſs-cutting paſture-ground, intended to have manure of any kind put upon it to meliorate the graſs. In this it will far exceed the ſcarificator, mentioned in one of Mr. Young's tours, as that inſtrument is liable, as well as the four-coultered plough, to be thrown out of its work when meeting with a ſtone or other interruption. This the ſward-cutter is proof againſt, which is looked on as its greateſt excellence.

In preparing for barley, the ſward-cutter excels a roller of any kind, in reducing the large hard clods in clay land, occaſioned by a ſudden drought, after its being plowed too wet; and it is likewiſe very proper for reducing ſuch clay land, when under a ſummer-fallow. In this operation the ſward-cutter is greatly to be preferred to the cutting roller, likewiſe mentioned by Mr. Young in one of his tours, from its wheels being all dependent one on another, ſo that when one is thrown out by a ſtone, three or four muſt ſhare the ſame fate: beſides, the cutting roller has but ſeven wheels in ſix feet, and the ſward-cutter has ſix in four feet three inches. at nine inches diſtant; and, if neceſſary, may have them ſo near as ſix inches.

After old graſs-ground is cut croſs with the ſward-cutter, and plowed, it has a very uncommon and worklike appearance, from each ſquare, turned over by the plough, being raiſed up an inch or two at the ſide laſt moved by the earth-board; ſo that the field, when finiſhed, is all prettily waved, and reſembles a piece of water when blown on by a gentle breeze. By this means a very great deal of the land's ſurface is expoſed to the froſt, and other influences of the air, which cannot fail to have a good effect on it.

Two horſes are ſufficient for the draught of a double-horſe ſward-cutter, and one horſe for a ſingle-horſe one; one man manages the machine, and drives the horſes. He begins his operation by firſt meaſuring off twenty or thirty paces from the machine, leſs or more, as he inclines, and there fixes a pole. He then cuts the field croſs, as near at right angles with the ridges as he can. When the cutting wheels are paſt the laſt furrow about a yard or ſo, and the machine is upon the outmoſt ridge of the field on which it muſt turn, he muſt ſtop the horſes, then take hold of the lever I. fig. 1, No. 2, and by pulling it to him, he raiſes the cutting wheels out of the ground, which are kept ſo by the loop of the rope being put over the pin R. in the lever I. No. 3, till the machine is turned and brought to its proper place, which is done by meaſuring off the ſame diſtance formerly done on the oppoſite ſide of the field. When the cutting wheels are exactly over the outmoſt furrow, then, on the horſes being ſtopped, ſlipt off the pin R. and the lever returned to its former place, as repreſented No. 2, which allows the weights L. L. &c. to force the cutting wheels into the ground again. He then goes on till the interval betwixt the firſt and ſecond ſtroke of the machine is all cut. In this manner the field is to be finiſhed, after which you may begin to plow when you pleaſe.——N. B. There muſt be a pole at each ſide of the field.

It is of no conſequence whether the land to be ſward-cut is in crooked ridges, or ſtraight, in flat ridges, or in very high-raiſed ridges; ſuch as are frequently met with in Scotland. Be the ſurface ever ſo uneven, it does not ſignify, as the cutting wheels being all independent of one another, are forced by their weights into every furrow or hollow.

One Sward-cutter will cut as much in one day as ſix ploughs will plow.

The land may lie ſeveral months in winter after being ſward-cut, when there is no vegetation to make the cuts grow together again before it is plowed; but the ſooner it is plowed after cutting, the better, that it may have the benefit of all the winter's froſt, which makes it harrow better and eaſier at ſeed time.

When the ground is harrowed, the harrows ought to go with the waves that appear after plowing, not againſt them, as by that means they are leſs apt to tear up the furrows all cut into ſquares. This need only be attended reſpecting the firſt two tines, as they are called, of the harrowing.'

Any common wright and ſmith may make the inſtrument. It is very ſtrong, very ſimple, and eaſily managed, and moved from place to place; and if put under cover, will laſt many years.

Fig. II. is the plan of a harrow invented by Mr. Sandilands, which he recommends in a particular manner, and to which he has given the name of the *Chain and Screw Harrow.* Its properties are, that if your ridges are high, and you wiſh to harrow them from one end to the other, by lengthening the chain (which the ſcrew commands) the harrow, when drawn along, forms an angle downwards, and miſſes none of the curve of the ridge, ſo far as it extends, which may be nine feet, the diſtance from A. to B. The diſtance from C. to D. is five feet ſix inches. When the crowns of the ridges have got what is thought ſufficient harrowing lengthwiſe, you ſhorten the chain by the ſcrew, which forms an angle upwards; the harrow is then drawn by the horſes, one on each ſide of the furrow, which completely harrows it, and the ſides of the ridge if eighteen feet broad.

When you want to harrow even ground or high ridges acroſs, with the ſcrew you can bring the harrow to be horizontal, ſo as to work as a ſolid harrow without a joint.

The teeth are formed and fixed in the common manner, ſquare, not in the faſhion of coulters, and are nine or ten inches below the wood, and of ſuch ſtrength as is thought the land requires. The teeth cut, or rather tear the ground at every four inches without variation, though ſeemingly placed irregularly without any riſk of choaking, except ſometimes at the extreme angles, where the teeth are neceſſarily near each other, which may be cleaned with the greateſt eaſe, by raiſing them a little from the ground. The figures 1, 2, &c. point out where the twelve teeth on each ſide the harrow are placed.

Where a ſtrong brake-harrow is not neceſſary, by making the teeth ſhorter or lighter, you may have forty-eight teeth, which will tear the ground at every two inches, or near it, cover the ſeed well, and make a fine mould.

It is recommended, that harrows for every purpoſe, and of any ſize, be made on the above principle, from which no tooth can ever follow the track of another, and all are kept conſtantly acting.

Fig. 3, and 4, the plan and profile of a harrow likewiſe invented by Mr. Sandilands, called a Wrack Harrow, from its very expeditious manner of bringing the wrack or roots of couch-graſs and other weeds together. It conſiſts of a plank of timber, ſix feet long, nine inches broad, and two inches thick, in which there are two rows of teeth fixed, twelve in front, and thirteen in rear, about four inches row from row, and about five inches from each other, which, in effect, brings the teeth to operate at two inches and a half one from another. They are in length about ſeven inches below the wood, three quarters of an inch ſquare, not ſharp, but pointed diamond ways, ſo as not to penetrate the ſoil, but only to catch what by preceding thorough harrowing is brought above ground. To the plank is joined ſhafts for a horſe, and handles for a man, of ſuch length and ſtrength as any workman may think neceſſary.

The manner of uſing the harrow is as follows: When the land is ſo well harrowed, as that all the roots of the quickens or couch-graſs, &c. are brought to the ſurface, the harrow is drawn acroſs the field, the holder preſſing a little, not much, on the handles, till the plank is immediately over the firſt furrow; on which, without ſtopping the horſe, he ſuddenly lifts the harrow which the ſhafts ſupport before; by this means, all the ſtuff gathered by the harrow, drops in the furrow; ſo on he muſt go; and when he has croſſed the field, he turns to the right or left, and croſſes the ridges again, as mentioned, obſerving not to miſs any of the land, keeping cloſe by the laſt track. From this operation, the whole wrack, &c. is left in the furrows, ready to be carted off the field, or burnt, as the farmer chuſes. If the horſe is not ſteady, a boy muſt be employed to lead him.

ARTICLE III.

Queries of Mr. LE BLANC, *reſpecting the culture of Turnip-rooted Cabbages, with Anſwers to the ſame, by Sir* THOMAS BEEVOR, *Bart.*

1. ARE they not a much longer time before they are fit to be hoed than turnips?

A. Yes, three weeks or a month.

Q. 2. Is not the hoeing conſequently the more difficult and expenſive, as the weeds have the greater advantage over them?

A. In a wet ſeaſon the hoeing is certainly more difficult; on a clean fallow, and in a dry ſeaſon, very little more; and I have never paid more for hoeing them, than for common turnips.

Q. 3. The colour of the plant being darker than that of a turnip, and more difficult to diſtinguiſh from the charlock, which generally abounds in turnip fallows, particularly the moſt early ſown, is it not another reaſon why the hoeing ſhould be more difficult and expenſive?

A. My workmen ſay, they can readily diſtinguiſh them from charlocks; and have never yet charged me more for them.

Q. 4. How many times are they hoed, and at what price?

A. This muſt depend partly on the ſeaſon; they are generally twice hoed, 4s. for the firſt hoeing, and 2s. for the ſecond.

Q. 5. Has it ever been obſerved, that the hardneſs of the root affects the ſheep's teeth; that objection having been made to them by ſhepherds?

A. Not keeping any breeding ſheep, but only wethers, which are ſold fat after having fed on them in the latter part of the ſpring of one ſeaſon, or two at the moſt; I have never obſerved the miſchief charged to them.

Q. 6. Is there any difficulty in making the ſheep eat them up clean?

A. I have not obſerved any, by making a lean ſtock follow the fat; but if there be, hogs will greedily eat up all the pieces, and thrive greatly upon them.

ARTICLE IV.

ON VARIOUS SUBJECTS.

To the Secretary.

SIR, *Hethel, Nov.* 20, 1791.

THE honour done me by your aſſurance, that the Gentlemen of the *Bath Society* would be pleaſed to receive the communication of any ſuch facts or opinions, connected with their views, as ſhall have fallen under my obſervation, being too flattering not to have excited in me the utmoſt ambition to comply with their deſire; I have, in conformity with their wiſhes, ventured to addreſs to you a few articles of information on ſome of the different ſubjects of their enquiries. Immediately on the receipt of your laſt letter, I made frequent enquiry amongſt the Gentlemen of my acquaintance in this county, who have large fir plantations on their eſtates, whether they had ever obſerved that great damage done amongſt them by the *ſquirrels*, which is ſo much complained of by ſome gentlemen in the counties of Somerſet and Wilts; and I have reaſon to believe, from that enquiry, that the evil is not confined to the abovementioned counties, as on two eſtates in this county, on which I believe the plantations of Fir are by far the moſt conſiderable, —I mean thoſe of the Marquis of Townſhend and Mr. Coke,—I am informed by the latter Gentleman, that the injury done to thoſe trees is ſo very great, that the price of a ſhilling per head is paid by him for all ſuch of theſe miſchievous little animals as are deſtroyed in his plantations; at the ſame time he told me, that, in Lord Sherborne's park in Glouceſterſhire, the miſchief done by theſe animals among the beech trees is very conſiderable: in my own plantations, neither beech nor fir-trees, of which laſt I have many, have ſuffered from them; but they every year bite off moſt of the young ſhoots of the young horſe-cheſnut trees, ſo as totally to deprive them of one of their principal ornaments, that of their flowers, for which they have long been proſcribed by me.

In anſwer to your enquiry, reſpecting Oak Plantations, I have incloſed to you thoſe returned by the gentlemen of this county, to the queſtions on that ſubject, addreſſed by the Commiſſioners of the Land Revenue to the Chairman of their Quarter-ſeſſions; which anſwers, having been drawn up from the beſt information that could be obtained from ſeveral principal timber merchants, as well as from the obſervations which were communicated to me by ſome of the moſt intelligent gentlemen of this county, may, I think, be fairly deemed, though perhaps not the univerſal, yet the general opinion of thoſe here, who are moſt and beſt informed upon the ſubject.

In the 2d Number of the ſecond volume of Dr. Anderſon's periodical publication, called the BEE, you have, I make no doubt, ſeen a new and eaſy method of forcing early potatoes, very accurately deſcribed by the Doctor, as alſo in the 8th No. of the 3d volume of the ſame entertaining and uſeful performance, the account which I gave him of my accidental diſcovery of the mode of obtaining them in the moſt early part of the ſpring. To that account, whether it ſhall ſerve only for amuſement, or may eventually be of any public benefit, I hope I may be allowed to add, that in order to ſee whether the Potatoes, produced as therein mentioned, had all the properties of thoſe growing in the regular and ordinary courſe, and would reproduce as good a crop as their parent roots; I took ſome of thoſe which had grown in the houſe, and planted them in my garden; which, although planted ſo late as in the latter part of the month of June, have grown well, and afforded me ſeveral roots as large and good as any of thoſe grown this year in the field; at this my ſurpriſe has been the greater, becauſe the ſets had but a few eyes, and thoſe were very ſmall. If this experiment ſhould ever enable a poor man, whoſe ſtock of Potatoes has been much diminiſhed by the wants of himſelf and family, to find a ſufficiency for his future crop, it cannot be deemed wholly uſeleſs.

I have this year on my farm ſome acres of the Swediſh Turnip, called Ruta Baga, which notwithſtanding the dryneſs of the ſummer have grown to a reaſonable ſize, weighing upon an average about three pounds and a half each without their leaves: this crop was not ſown until the 27th of June, whereas had it been ſown earlier, which the drought prevented, I am very certain the plants had been much larger; as on thoſe gentlemen's lands where they were ſown in May, the roots are at leaſt one third bigger. However, their want of ſize never diminiſhes the crop ſo much as is apprehended, if, at the time of hoeing them, they are left proportionably thicker on the ground. From that experience which I have had of them, I conceive from eight to ten inches to be a ſufficient diſtance for theſe plants. On the firſt of October laſt, I had ſome of thoſe which had perfected their ſeeds in the autumn taken out of the ground, and found their roots ſound and very palatable; but for a juſt and true account of theſe moſt valuable turnips, and the proper uſe of them, I cannot do better than refer all farmers to the account given of them in the eighth Number of the Third Volume of the Bee.

The dibbling of wheat, notwithſtanding the introduction of Mr. Cook's drill-plough by ſeveral gentlemen and ſome farmers upon their lands, ſtill continues to be the moſt general and favourite practice of this county; if the crops raiſed by this method be equally good, (and no experience has yet proved them to be otherwiſe) I cannot but wiſh, for the ſake of the poor, that it may never be abandoned for any other.

I am, with real regard and eſteem,

Your's,

T. BEEVOR.

Queſtions addreſſed by the Commiſſioners of the Land Revenue to the Chairman of the Quarter-Seſſions of the County of Norfolk.

Queſtion 1ſt. WHETHER the quantity of large oak timber in general, fit for the uſe of the navy, growing in the county aforeſaid, is increaſed or diminiſhed within memory?

Anſwer. It is certainly diminiſhed in ſome parts of the county, but not generally ſo.

Q. 2. Whether particularly the quantity of *ſuch* timber, growing in woods, is increaſed or diminiſhed?

A. The quantity of *ſuch* timber growing in woods appears to be inconſiderable, and neither much increaſed or diminiſhed.

Q. 3. Whether there is an increaſe or decreaſe of the quantity of ſuch timber growing in hedge-rows?

A. The timber in the hedge-rows is decreaſed, owing to the circumſtances mentioned in the next anſwer.

Q. 4. Whether the growth of oak timber in hedge-rows is generally encouraged, or whether the grubbing up of hedge-rows for the enlarging fields and improving arable ground is become common in the county?

A. From the converſion of paſture land to arable, the enlargement of fields, and above all, the miſchievous practice of both the farmer and the poor, of trimming up, and cutting off all the lateral branches, the trees in the hedge-rows are few and little worth in many places.

Q. 5. Whether in ſuch oaken woods as are cut at ſtated times in ſucceſſion, it is cuſtomary to leave young ſaplings at each cutting? and if ſo, whether they are generally barked at the ſecond fall and cut down for country uſes, or preſerved for timber?

A. There is in every part of the county proper attention paid to the leaving young ſaplings, which are never barked at the ſecond fall, nor felled for country uſes: Fir being in almoſt general uſe, except when oak is abſolutely neceſſary.

Q. 6. Whether the improvement of roads and the navigable canals, made during the laſt thirty years, have not, by reducing the expence of carriage, been the means of bringing large ſupplies to the Dock-yards, which could not otherwiſe have been brought there?

A. The timber in this county was always well ſituated for removal, and though the roads are much better than formerly, yet the price of land carriage is increaſed from 3d. to 6d. per load, per mile, within the laſt 20 years, which may be accounted for from the high price of horſes, the extra charge of keeping them, and other ſundry reaſons. There is no navigable canal in the county, nor have larger ſupplies of timber been ſent to the dock-yards on the above accounts.

Q. 7. Whether of late years greater quantities of timber have not, in conſequence of this increaſed facility of carriage, been felled in thoſe parts of the country which were before inacceſſible, than they will be able permanently to ſupply?

A. There are few or no parts in this county which are, or ever were inacceſſible, nor any greatly increaſed facility of carriage; therefore no greater quantity of timber has been felled on thoſe accounts.

Q. 8. Whether the general conſumption of oak timber for building, or other uſes, within the county, is increaſed or diminiſhed; and to what cauſe in your opinion is ſuch increaſe or decreaſe to be imputed?

A. The uſe of oak timber for building, &c. is certainly diminiſhed, for the following reaſon, to wit, from the cheapneſs of fir-timber, and the great eaſe with which it is worked, and converted to uſe.

Q. 9. Whether the price of oak timber, for carpenters or other uſes, is increaſed within the laſt 40 years, and in what proportion?

A. The price of oak timber for carpenters and country uſes, is very little, if at all, increaſed within the laſt 40 years, for the reaſon mentioned in the foregoing anſwer.

Q. 10. Whether the improvements of roads, and the navigable canals, have not introduced the uſe of coals in parts of the country, in which wood was before generally uſed for fuel? and whether in ſuch parts the demand for underwood, and the value of it, have been increaſed or leſſened?

A. The uſe of coals is much more general than formerly, partly perhaps owing to the improvement of the roads, but more to the decreaſe of pollard trees and hedge-rows: the value of fire-wood is ſomewhat increaſed.

Q. 11. Whether in thoſe parts of the country in which underwood is more valuable, in conſequence of a demand for hop-poles, or from other cauſes, it has become the practice for many years more than formerly, to cut down the great timber-trees on account of the injury they do to the underwood?

A. There are few or no hops grown in this county; and the great timber-trees are not more cut down for the benefit of the underwood than heretofore.

Q. 12. Whether there has been a greater quantity of woodland, formerly producing oak, converted to tillage within memory, than of land of a fit ſoil newly planted with oak?

A. It is generally thought, there has not for upwards of fifty years back.

Q. 13. Whether the plantations which have been made within memory, have been chiefly of oak, or of the kinds of trees not fit for the navy?

A. From about 20 to 40 years back, Scotch fir, and other ſoft and ornamental wood, were much planted: ſince that time, oaks have been much more planted and ſown.

Q. 14. Whether there are any commons, or commonable woods, of conſiderable extent in the county? and whether the quantity of timber growing in ſuch woods or commons is conſiderable?

A. There are not many waſte or commonable woodlands of any conſiderable extent in this county; and the quantity of timber in thoſe few which there are, is not conſiderable.

Q. 15. Whether the timber in ſuch commons or commonable woods, is well preſerved, or ſuffers great depredation and waſte?

A. What few timbers there are, ſeem to have little care taken of them; in general they ſuffer much depredation.

Q. 16. Whether on ſuch commons or commonable woodlands, as have been divided and incloſed, any conſiderable quantities of wood or timber have been raiſed?

A. The commons and commonable lands which have been incloſed, have been either large arable fields, or paſture land, which has been chiefly on its incloſure converted to arable: of courſe no great quantity of wood can have been raiſed in them.

Q. 17. Whether a further diviſion and incloſure of ſuch commons and commonable woodlands, would in your opinion be the means of increaſing the quantity of wood and timber?*

A. A diviſion and incloſure, under proper regu*lations, might poſſibly be the means of increaſing* the quantity of timber; but unleſs there was ſome compulſory clauſe inſerted in the act to ſet apart a certain proportion for the growth of timber, ſuch lands would chiefly be uſed in tillage.

GENERAL OBSERVATIONS.

The growth and improvement of oak timber, is certainly a matter of ſo much conſequence, and of ſuch great national concern, that the want of it cannot be too greatly dreaded, or precautions for the prevention of it too ſoon adopted: however, at preſent there does not ſeem to be in this county any juſt ground to apprehend the want of it, at leaſt of ſmall timber. The only two ports of note here, for building and repairing ſhips, are Yarmouth and Lynn, in which there has been no alteration in the price of timber for many years, excepting only ſmall *occaſional* fluctuations in it. And if the price of large oak timber has in the kingdom at large increaſed (as it is ſaid to have done) from 7s. 6d. to 10s. per load, it ſhould at the ſame time be remembered, that the cônſumption of oak timber between the years 1777 and 1783, ſix years only, was more than *for the preceding 23 years. In the year 1783, I* have been informed there were 43 ſail of the line, and 52 forty-gun ſhips building in the public and private yards; beſides ten Eaſt-India ſhips of 900 tons each.

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* Any further obſervations or information, on the ſubject of the preceding queſtions, will be very acceptable.

Dated, Land Revenue Office, Dec. 20th, 1790.

ARTICLE V.

On MOWING CABBAGE.

TO THE SECRETARY.

DEAR SIR,

THE manner in which the gentlemen of your Society have always received thoſe few articles of intelligence which it has been in my power to communicate to them, is expreſſed by you in ſuch terms, as to impreſs upon me the higheſt ſenſe of their candour, as well as of your polite and moſt friendly diſpoſition towards me. I wiſh I could flatter myſelf, that I had ever been, or could yet be deſerving of their and your eſteem.

By a note incloſed in your laſt letter, you tell me that a gentleman had been with you, wiſhing to know, whether the mowing Cabbage had been found by me to ſhoot again, after having been *fed down*; to which, I am ſorry to anſwer, that it did not do ſo with me, in any ſuch degree, as to make it worth preſerving for that purpoſe: when I ſay that I am ſorry to anſwer ſo, it is becauſe, had the reſult of the trial been otherwiſe, the cultivation of thoſe plants would have been an invaluable practice, on ſuch hot burning ſoils as will afford little or no graſs in the ſummer ſeaſon. However, it muſt be obſerved, that mine were fed down by ſheep, perhaps too cloſely, and that the very few ſprouts which afterwards appeared, were, I believe, ſome of them eaten down by the hares.

The anſwers to the queries, which I tranſmitted to you in my laſt letter, were ſuch as, on the moſt exact and ſtrict enquiry, I could obtain from the principal timber merchants, as well as from the beſt informed gentlemen of this county; and I have reaſon to think may be fully relied upon. I have the ſatisfaction to be able to add, that the propagation of oaks, by ſowing the acorns, and planting young trees from the ſeed-beds, is now frequently and extenſively practiſed here by gentlemen in their ornamental and other plantations.

I am, &c.

THOMAS BEEVOR.

Hetbel, Jan. 7, 1792.

ARTICLE VI.

On Accuracy in the Characteriſtick Diſtinctions of Plants, &c.

TO THE SECRETARY.

DEAR SIR,

IN almoſt all the communications of new diſcoveries and experiments, particularly in agriculture, it has been obſerved, that the firſt publiſhers of them are ſo apt to ſee, and repreſent them in a flattering light, that the public, perpetually deceived and diſappointed in their high-raiſed expectations, becomes ſceptical, and even averſe to all trial of them. Would Gentlemen, therefore, be ſatisfied, with barely relating, and with due preciſion marking, the ſeveral reſpective diſadvantages, as well as the advantages attending the culture of the particular plants they judge proper to recommend to notice, we ſhould much ſeldomer hear the reproachful terms of ſpeculative and viſionary triflers beſtowed upon them. What has led me to make the above remark, is, that amongſt all the plants lately recommended for the winter food of cattle, (to wit, the Mangel-Wurzel, Turnip-rooted Cabbage, Ruta-Baga, Mowing-Cabbage, and Cow-Cabbage) none of their particular properties have been ſo diſcriminated and fairly ſtated, as to have left the cultivators without ſome conſiderable ſhare of diſappointment, in the proper uſe and value of them. To do this juſtly, I feel myſelf ſo very incompetent, that I ſhall leave the taſk to others better qualified, and of more leiſure, reſting contented with having furniſhed the hint only. To explain my meaning, I would, for inſtance, have it mentioned among their other properties, (if by experience it ſhould be found to be ſo,) that the Mangel-Wurzel will not endure our froſts, if left in the ground during the winter;—that the Turnip-rooted Cabbages will reſiſt the ſevereſt froſts, but are attended with very great trouble and expence to get them out of the earth; that when taken up they require to be cut to enable the cattle to eat them, and ſhould be uſed only the laſt of all other green food, which they will well ſupply, until there is a ſufficiency of graſs;—that the Ruta-Baga plants, though they appear to afford the ſweeteſt and moſt nutritive food of all the roots, and though the value of the root has been found to be little or nothing diminiſhed, even after it has borne its ſeed, yet will it not abide the ſeverity of froſt much if at all better than the common turnip;* to which may be added, that one conſiderable advantage attendant upon them, as well as the Turnip-rooted Cabbages, is the vaſt abundance of food they each of them ſupply by their buſhy tops in the ſpring;—that the Mowing Cabbage ſeems better calculated for culinary uſes, than for cattle;—and that the Cow Cabbages, to pay the greateſt profit, ſhould certainly be all ſpent before Chriſtmas.*

Of the juſtice of all the above hints, I will not preſume abſolutely to vouch, but that they have appeared in ſuch a light to me, I will venture to ſay; and as the ſole deſign of this letter is but to invite better and fuller information; if that end be obtained by it, it will not have proved quite uſeleſs, although it ſhould be thought not void of miſtakes.

I am, Sir,
With great regard, your's,

THOMAS BEEVOR.

Hethel, March 1, 1792.

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* N. B. On the ſtrongeſt part of the ſoil they have, with me, grown the largeſt, to upwards of four pounds each; and contrary, I think, to the common turnips, they rot univerſally from the tap-root upwards, ſo that all of them above ground appear and prove to be quite ſound, and uninjured by the froſt, whilſt almoſt all the part in the earth is quite decayed, and a mere pulp.

OBSERVATION. *The weight of this plant, as ſtated by Sir Thomas, we find to be far below the average weight, produced on the ſtrongeſt lands in other parts of the kingdom.*

ARTICLE VII.

On the beſt Method of planting MANGEL-WURZEL, *and of its Uſe and Value for feeding Pigs, Cattle, &c.*

TO THE SECRETARY.

SIR,

I Apprehend the beſt and moſt acceptable return I can make your very reſpectable Society for the Mangel-Wurzel ſeed you were ſo kind as to ſend me, will be to ſend them a particular account of the method I uſed in the culture, and the uſes I applied it to, with my obſervations thereon. It was the beginning of April when I received the ſeed; as I had no ground ready for ſowing, it was the 13th of the ſame month before I could put it into the ground, which was by no means in fit condition for ſowing; but as the ſeaſon was already too far advanced, no time was to be loſt. I had the ground ploughed up in two-bout ridges, which makes them about three feet wide from the middle of one furrow to that of another; the tops of the ridges about two feet, and the furrow or interval between them one. By this method the mould on the ridges was laid conſiderably thicker, which is a great advantage to tap-rooted plants of every kind. My method of planting was as follows:

I have a ſhort cylinder, or rather roller, made of oak, about two feet long, and 14 or 15 inches diameter. The length is divided into five equal parts, and in the circumference of each is inſerted a circular row of wooden tines or pegs, exactly ſix inches diſtant from each other. They were cut out of ſpine oak an inch and a half ſquare, bluntly pointed at top, and project about three inches from the ſurface of the roller. This inſtrument, being drawn along upon the middle of a ridge, indents the ſame in five lines, with holes exactly ſix inches every way from each other. I began with planting three rows out of the five in each ridge, that is to ſay, the middle and two outſide ones. This was done by dropping two ſeeds in each hole. The rows then are one foot aſunder, and the ſeeds in the rows juſt ſix inches.

When one ridge was planted in this manner, I thought the plants would be much too near, and the intervals too narrow for horſe-hoeing. In the remainder of the ridges, therefore, I only planted two rows, next the outſide ones, leaving out the middle and the two outſide ones, and in the rows paſſed every other hole, ſo that the plants would now ſtand a foot apart in the rows, and the intervals were two feet wide, which was quite ſufficient for horſe-hoeing.

At length the plants came up very regularly and well; but the ground having had but one ploughing, the weeds very ſoon overtopped them. *Women were then ſet to work to weed them by hand,* which they performed very completely. The plants at that time made a wretched appearance; but in leſs than a month after were indeed very promiſing. The weeds came up again very thick, and grew faſt; the hand-hoes were then ſet to work, and immediately followed by the horſe-hoe. This left them very clean, gave them freſh well pulverized earth, and from this time they grew very rapidly.

In July the outſide leaves ſeemed to have attained their full growth nearly; they were therefore plucked off, and given to the pigs.

This mode of planting ſucceeded very well, yet I think it is capable of conſiderable improvement. When I plant this article again, I will have the ground ploughed in ridges of the ſame ſize as before; but inſtead of two or three rows, I would have but one, which ſhould be exactly in the middle of each ridge, the ſpare ground then between the rows would be a yard wider, which would admit of the horſe-hoe being worked very freely. The ſeed ſhould be dropped eight or nine inches apart, and one good ſeed only in a hole. Suppoſing all ſhould grow, then the plants would ſtand three feet row from row, and at eight or nine inches diſtance *in the rows; but this would be juſt double the number* of plants neceſſary; for 16 or 18 inches is quite near enough. Suffitient, therefore, might be drawn from theſe, to ſupply the deficiencies that would neceſſarily happen from imperfect ſeeds, &c. and if not wanted might be eaſily cut up with the weeds in hand-hoeing, for they ſhould by no means be ſuffered to ſtand too thick.

I have at this time ſome plants in a very thriving condition, which were tranſplanted; and though in general I have no great opinion of tranſplanting tap-rooted plants, eſpecially ſuch whoſe roots conſtitute the principal part of the produce, yet I know not if, upon the whole, this would not be the moſt profitable method of cultivating this plant. In that caſe, the ſeeds ſhould be ſown in a nurſery-bed as early in March as the ſeaſon will admit, and in the interim between ſowing and tranſplanting, the ridges ſhould be well prepared for the reception of the plants. The advantage of being removed into a clean well-pulverized ſoil is great indeed, if a favourable ſeaſon be taken for that buſineſs! It is the method I have followed ſeveral years with the turnip-rooted cabbage, and I am well convinced it is the moſt profitable and œconomical of any uſage in practice.

It may, perhaps, be thought by ſome too laborious and expenſive, but if they would make the experiment, they would ſoon be convinced of the contrary. A dexterous labourer would ſet a large piece of ground in a day, and when ſet they would be done with, all but weeding; for being planted at due and regular diſtances, the whole of the operation at once is finiſhed. But if the ſeeds are ſown or dropt, the plants muſt be ſet out to a proper diſtance, which would be found to be as expenſive as tranſplanting, and the ground by no means ſo clean and in ſuch perfect condition as it muſt be made for tranſplanting. The difficult queſtion is, whether the roots of the tranſplanted would be equally fine with thoſe which had never been removed. This, from ſome obſervations I have made, ſeems to depend much upon the age and ſize of the plants when they are removed. The root in its firſt growth pretty much reſembles the carrot, and if it be drawn when not above three or at moſt four inches long, and the hole in which it is to be planted be made deep enough to receive it without bending or diſtorting it, the root will receive no injury; but if it be bent, broken, or twiſted, it will certainly occaſion an unnatural ſhape, and I ſhould fear diminiſh its ſize.

Being planted in this manner at the diſtance of three feet row from row, the intervals by horſe-hoeing may be kept perfectly clean, and the ground between the plants equally ſo by hand-hoeing. The ſoil then would be in a moſt deſirable ſtate for a crop of barley the ſpring following.

In the next place, I propoſe to give ſome account of the crop and its beneficial uſes. Between July and November, both incluſive, the leaves were cut three times, and a plentiful crop there was at each cutting. We began with plucking off the outſide leaves, but this was ſoon found too tedious and troubleſome. I therefore ordered them to be cut clean off about an inch above the crown of the root. This is a neceſſary precaution, for if they are cut too cloſe, the rain lodges on the top and rots the root. A dextrous labourer with a ſharp knife with a long blade would cut enough for a great many hogs in a ſhort time.

The laſt winter was very mild, and neither the herbage nor roots ſuffered any injury from froſt; indeed they put forth freſh leaves through the winter; therefore I did not take up any of the roots till the end of December; I then cauſed about half of them to be taken up, piled in a heap in the barton, and covered them over with ſtraw. This preſerved them till the time came for planting them out for ſeed. The other half, left in the ground to ſtand for ſeed, is now (in Auguſt) vigorous and healthy, and promiſes a large quantity of ſeed, as do thoſe alſo which were tranſplanted; but they do not ſtand ſo firmly in the ground as thoſe that were not removed. I am next to ſpeak of the uſes they were put to.

The leaves were cut every morning, and given freſh to the pigs two or three times a day. It is not eaſy to deſcribe how voraciouſly they ate them. I know no food they are equally fond of. Even the hogs that are fatting would often leave their peaſe and barley-meal, to feed on the leaves of the Mangel Wurzel. The cows alſo ate them with an exceeding good appetite, and were certainly very deſirous of them. After harveſt the weaned calves were turned into the field, at one end of which they grew, they ſoon found them out, feaſted deliciouſly upon them, and were manifeſtly improved by them.

During the time the plants were growing, I often gave a ſew of the roots and greens together, but neither cows or pigs were at all ſond of the roots, in that ſtage of their growth; they always left the greateſt part of them. This circumſtance alarmed me; but was entirely done away in the winter, for then both cows and pigs ate them as kindly as they would have done any food whatever. The roots in general were ſo hard and firm, that I found it neceſſary to have them cut in ſlices, which a labourer did with a ſmall bill-hook on a treſſel, and could cut ſeveral buſhels in an hour.

The greateſt inconvenience that attends them is the great quantity of mould that ſo firmly adheres to them. The roots are covered with innumerable fibres, which embrace the mould too firmly to be eaſily ſeparated from it. This is a matter of no great ſignification in feeding hogs, who are conſtantly delving in the dirt; but perhaps it is not quite ſo clear that in time it might not prove injurious to cow cattle.

As my cows and pigs were fed with them promiſcuouſly together with other food, I am unable to aſcertain what would be the amount of the produce on any given quantity of land valued in money; but I am pretty certain, that an acre of land planted as above, would well maintain twenty ſtore pigs from ſix to eight months, and in that time their improvement could not be leſs than 14 or 15s. a pig. The labour of preparing this article of food would indeed be a conſiderable deduction from the ſum, whatever might be the amount. However, at all events, it muſt be allowed to be a very valuable article of culture, and well worthy the huſbandman's attention.

I am, Sir, your's, &c.

JOSEPH WIMPEY.

Bockhampton, *Aug.* 10, 1790.

P. S. I obſerve Sir Thomas Beevor's account of the Mangel-Wurzel (Art. 36. vol. 5,) is by no means ſo favourable as the above. More than half of his plants were not ſound and fit for uſe in March. Whereas mine, eſpecially thoſe left in the ground, were not injured at all by the cold of the winter. The laſt winter, it is true, was uncommonly mild, but I fear, indeed, that they cannot bear the ſeverity of a hard one. From Sir Thomas's account in a former paper, of the ſuperior ſize of his, I ſhould apprehend his ſoil is richer and moiſter than mine. He ſays (I think) that ſome of his were 18 inches in circumference, and upwards; whereas the largeſt of mine were not more than 14 or 15; but the far greater part were only from 10 to 12. My ſoil is gravelly and dry, which ſeems not favourable to the large growth of this root, but then it is leſs ſuſceptible of froſt, and probably for that reaſon they were not ſo liable to be injured by it. The ſtems of ſome of my plants are now ſeven feet high, and nearly as thick as a man's hand-wriſt. The ſeeds ſeem nearly of a full ſize, but are as green as ever, and I think will not be fit to cut theſe five or ſix weeks. At all events, I think this plant would afford a very large quantity of deſirable food for ſix months out of the twelve, (ſay, from the beginning of July to the end of December) and in a favourable ſeaſon, two or three months longer. But in ſevere winters I am afraid there can be no dependance upon it after Chriſtmas, unleſs means ſimilar to thoſe uſed to preſerve potatoes be adopted for their preſervation.

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ARTICLE VII.

Of the Cauſe of the Smut in Wheat.

In a Letter to the SECRETARY.

SIR,

IN a former paper on this very difficult ſubject,* I obſerved, it was no unuſual thing to meet with ears both of ſmutty and ſound corn iſſuing from the ſame root. Alſo, that it frequently happened that ſmutty and ſound grains were to be found in the ſame ear. That I had then by me the corn I had picked out of ſuch an ear. It contained forty ſmut balls, 21 grains that appeared to be perfectly ſound, and five grains which had one end black and ſmutty, and the other ſound. Theſe I made the ſubject of experiment, the reſult of which I now beg leave to lay before the Society for their conſideration.

On the 2d of September 1789, I put the twenty-one grains abovementioned into a two-ounce phial of pump-water, which I very well ſhook together. It was then ſet by till the next day, when the water was poured off, and the corn divided into two parcels. Having filled a two-quart garden-pot with common mould, ten of the grains were ſet in five holes about two inches deep. The other eleven grains were returned into the phial, being firſt nearly filled with a ſtrong pickle of ſalt and water. After ſtanding 24 hours, theſe were alſo ſet in a garden-pot, in all reſpects ſimilar to the other. My intention in theſe different proceſſes was to diſcover, 1ſt, if corn from a ſmutty ear, merely by rincing in ſimple water, would produce ſound corn free of ſmut; and 2dly, if a ſtrong ſolution of ſalt and water would more effectually anſwer that deſirable purpoſe, as was generally believed and inſiſted on.

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* Article xvii. vol. 56.

The beginning of December I obſerved the plants ſeemed much crouded, and wanted more ſuſtenance than the ſmall quantity of earth the pots contained could ſupply. On the 8th day, therefore, I took them out of the pots, and planted them in a row in the field, about eight inches apart, keeping, however, the plants of each pot ſeparate. There was no perceivable difference in the plants, both pots had ſhot vigorouſly, and it was truly amazing to ſee the immenſe quantity of roots the pots contained; the ſides being completely lined, with the ſame running round and round, to an incredible length, from whence it ſeems very probable, that the roots of wheat in good land, well pulverized, may extend and collect ſuſtenance at ſome feet diſtance from the parent ſeed.

At this ſeaſon vegetation is nearly at a ſtand. It was the end of March, or beginning of April, before the plants began to ſhew the leaſt appearance of recovery from the check occaſioned by tranſplanting: however, they then began to ſhoot vigorouſly, and at length acquired an uncommon degree of ſtrength, length, and ſize of ear and plumpneſs of grain, and from 12 to 24 offsets, or ſtalks from each plant. I reckon I am much within compaſs in ſuppoſing that the produce of theſe 21 grains was not leſs than 15,000, and the grain as plump and fine as ever I ſaw, and every corn perfectly free from ſmut. It would be ridiculous to ſuppoſe, that this corn was in any reſpect better than it would have been from ſound and perfect ſeed. Its extraordinary vigour I impute ſolely to its being tranſplanted into freſh ground, well pulverized, which could not fail to give much additional ſuſtenance and ſtrength to the plants, and would probably afford the greateſt produce poſſible on any given quantity of land. But I am ſenſible it could never anſwer the extra expence, nor be at all practicable on a large ſcale, notwithſtanding ſome mere ſpeculative men have wildly imagined the contrary.

From this account, it is as certain as experiment can make it, that a ſmutty crop of wheat is not the neceſſary reſult of ſowing ſeed from corn that is ſmutty; nor that it owes its corruption to any vicious principle or defect in the ſeed. In this experiment we ſee the ſeed, rinſed or ſoaked in ſimple water, produced as clean and perfect grain as that which was ſoaked in a ſtrong ſolution of ſalt and water; and therefore were not in the leaſt tainted by the ſmutty grains in the ſame ear, nor at all affected by the cauſe, whatever it was, that vitiated them; or if they were, that the ſoaking and rinſing in ſimple water was as effectual to the preſervation of the crop from ſmut, as the ſtrong pickle. But it is a truth univerſally known from experience, that in unfavourable years corn is generally ſmutty, notwithſtanding brining, liming, and every precaution hitherto uſed to prevent it. From all which it clearly appears, that the general cauſe of the ſmut does not exiſt in the ſeed, but is owing, if not altogether, yet in a very great degree, to ſome vitiating principle in the air, a conſtant concomitant of cold, wet, ſtormy, tempeſtuous ſummers, which are ever attended by ſmutty crops. My reaſon for ſuppoſing the ſmut may ſometimes poſſibly be derived from the ſeed will appear hereafter.

In the above experiment, one thing occurred which I muſt not omit, for it well deſerves to be noticed. One part of the ſeed was ſoaked in clear water only, the other in a ſtrong ſolution of ſalt and water. I could perceive no difference in the plants on a comparative view, from the time of their firſt coming up to the maturity of their growth, except in their tillering. The plants in both experiments were equally vigorous, equally tall and ſtrong, the ears equally long, large and full, and the grains equally plump and heavy; but thoſe ſteeped in the brine tillered out conſiderably more, that is, put out many more ſtalks, than thoſe ſteeped in water only; conſequently were much more productive. What the ſuperior fructification was owing to, is well worth enquiry. The ſeed was out of the ſame ear, and though ſet in two different pots, it was in the ſame earth, and tranſplanted into the ſame ground; the culture in every reſpect the ſame; the only difference was, in one the ſeed was ſteeped in clear water 24 hours, and then planted; the other, after being ſteeped 24 hours in the ſame water, was ſteeped 24 hours more in ſalt and water. The queſtion is then, and a very intereſting one it is, whether the ſuperior fecundity of the latter was owing to the ſeed being ſteeped twice as long as the other, or to its being impregnated with the ſalt uſed in the ſolution, or to ſome ſecret cauſe not diſcovered, and poſſibly not capable of being diſcovered, by the experimentor.

By repeating and varying theſe experiments, it would be eaſy to diſcover, whether fertility is promotable by ſteeping a longer or a leſs time in water; and 2dly, if water in which a good quantity of ſalt has been diſſolved, does not encourage and promote vegetation more than ſimple water?—If it ſhould be found to do ſo in any conſiderable degree, I cannot have a doubt but a ſtrong lixivium made of wood aſhes would promote it much more. I have always been of opinion, that ſuch menſtruums were uſeleſs, or at moſt, that their aids at beſt extended no further than the firſt rudiments of plants; but the fact recited above ſtrongly inclines me to repeat the experiment, in order, if poſſible, to fully aſcertain the facts.

In the next place I propoſe to give an account of an experiment made with the five grains mentioned above, which were ſmutty at one end, and ſound at the other. Theſe were ſet in a ſmall garden-pot like the former, one of which only came up. In the ſpring it ſeemed to want more room; I therefore dug a hole in the ground, and, taking the mould out whole from the pot, it was planted in the ſame without diſturbing the roots. It ſoon grew vigorouſly, but never had the healthy and robuſt appearance of the former. It had always a ſickly greeniſh yellow look, which betrayed its malady; notwithſtanding its ſtems grew to a good height, and tillered ſurpriſingly. I counted 24 ears from this ſingle grain, moſt of them of a good length, but lank and thin, very unlike the appearance of thoſe ſmutty ears which are not affected till the blowing ſeaſon; for theſe very often are the fineſt and plumpeſt ears in the field, till that time.

Of theſe 24 ears, 23 of them were entirely ſmut not a ſound corn could be found among them. The other was quite a ſmall underling ear, which did not appear till a full month after the other, but always bore a healthy countenance. This ear produced 14 corns only, and thoſe ſmall and thin, but ſound and perfect. Theſe were planted again laſt Auguſt, and are now as fine and promiſing as any corn in the field.

From this experiment it ſeems to appear, that a grain which is vitiated with the ſmut, yet has enough of the vegetative principle ſound to enable it to grow, infallibly produces ſmutty grain. That one ear, and one only, out of 24, ſhould be ſound, is indeed very ſtrange; but perhaps not more ſo than that, in the animal creation, the offspring of a diſtempered ſire may in general be affected by the vitiated ſtamina of the ſire, yet ſome one or more may eſcape the hereditary taint, and appear perfectly ſound.

From theſe, and the experiments of the former paper, the following corollaries are clearly deducible:

1ſt. That ſound grains, from very ſmutty ears, produce as clean and as ſound crops as ſeed from corn that is perfectly free from ſmut.

2dly. That ſeed from the ſoundeſt and cleaneſt crops doth frequently, in wet, cold, unfavourable ſeaſons, produce ſmutty crops, in ſpite of ſteeping, brining, liming, change of ſeed, and every device and invention which the wit of man hath ever practiſed.

3dly. That in fine, dry, warm ſummers, it frequently happens there is little or no ſmut at all, and that in many inſtances, where ſmutty ſeed has been ſown, the produce has been clean and perfectly free from the ſmut.

4thly. That the ſmut is not an hereditary diſeaſe, proceeding from a corrupt or vitiated ſtamina in the ſeed, but uſually and almoſt entirely occaſioned by ſome blight or vitiating principle in the atmoſphere, which corrupts or deſtroys the vivifying principle, at the time of its blowing and fecundation.

5thly. If the ſmut ever proceeds from diſtempered ſeed, it can be only from ſuch as hath the germ or ſeminal principle ſound and entire; for mere ſmut balls are as incapable of vegetation as powder of poſt, or the moſt effete matter in nature; but this is a caſe ſo rare as not to be adequate to the production of a millionth part of the ſmut that happens; therefore it muſt generally proceed from ſome malignant principle, which at ſome ſeaſons ſubſiſts in the air.

6thly, and laſtly, If the cauſe of the ſmut does not ſubſiſt in ſome latent or occult corrupt principle in the ſeed, but is generally occaſioned by the intemperance of the air, ſix or eight months after the ſeed was ſown, it ſeems perfectly nugatory to uſe any means to remedy or prevent a diſorder, which has no exiſtence, even in its cauſe, and moſt probably may never happen, unleſs it could be made appear, that ſuch means beſtowed ſuch a degree of ſtrength and vigour to the plants, as might render them leſs ſuſceptible of any malignant impreſſion from the atmoſphere, which might happen to reign during any future ſtage of their growth.

I have now ſeveral more experiments in proſecution, having ſet many ſmall quantities of ſound grain, picked from ſmutty ears at different times. At preſent they all appear very promiſing, but the reſult cannot be known till the next harveſt, when, if found intereſting, I may probably requeſt leave to lay them before the Society. I am, Sir,

Your much obliged ſervant,

North-Bockhampton, JOS. WIMPEY.
Dec. 21*ſt*, 1790.

ARTICLE IX.

On the DRILL HUSBANDRY.

DEAR SIR,

YOU will probably be much ſurprized to hear, after ſo many years practice, I ſhould not yet be able to make up my mind reſpecting the beſt, that is, the moſt beneficial mode of practiſing the

Drill Huſbandry. But practical huſbandry is attended with ſuch a variety of circumſtances, and thoſe ſo differently combined, that the ſame method of practice is often attended with ſuch different ſucceſs, as puzzles and perplexes the agent, and leaves the judgment in doubt. I am at this moment at a loſs, whether it is beſt to drill wheat in ſingle, or in 2, 3, or 4 rows. I have tried them all, but what I have generally practiſed is drilling on three-bout ridges, 3 rows, 11 or 12 inches aſunder. Three bouts form a ridge about 4½ feet broad; three rows, at the diſtance above, occupy 2 feet, and the horſe-hoe running along the ſide of each outſide row, at about 3 inches diſtance from the ſame, leaves the ridge 2½ feet broad, and the intervals between the ridges about 2 feet. This has been my uſual method, which has commonly ſucceeded well; but as I have conſtantly obſerved that the outſide rows are by far the ſtrongeſt and moſt vigorous plants, I am much inclined to believe that two rows only on two-bout ridges would be as productive, and leave the ground in better condition. However, as the ſame machine will ſow any number of rows from five to two, every perſon may determine for himſelf. I will therefore get one made as ſoon as I conveniently can, and ſend it as you direct; though I am ſomewhat

what afraid I may put your patience a little to the ſtretch, but it ſhall be as little as I can.*

I am &c.

North-Bockhampton,
May, 1791.

JOS. WIMPEY.

ARTICLE X.

On Field Mice, and the Tranſplantation of Wheat.

GENTLEMEN,

IT ſometimes happens from heavy rains, and long continuance of rain following a late harveſt, that the lands intended to be ſown with wheat are not in proper condition to receive that grain; prevented by this circumſtance, ſuch land may yet be in reſervation for a favourable period in the enſuing ſpring, for the reception of autumnal ſown wheat; and I have reaſon to believe, from the following experienced proceſs, that no ſignal diſadvantage would reſult from ſuch a neceſſary prevention.

In the ſpring of this year, as well as at equal periods, many years paſt, I obſerved in many ſown fields, large tuſſocks of bladed wheat, which I knew aroſe from the reſervoirs of corn collected by the field mouſe; which tuſſocks either ſprout from her magazine when ſaturated by rain, or more probably by the death of the architect.

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* This promiſe has been performed.

I took a part of two or three of theſe tuſſocks matted together at the roots, and divided them ſingly, or rarely left more than two roots conjoined; I placed them in dibbled holes, on a freſh turned-up bank, much under the ſame regulation as the practice of dropping wheat in Norfolk; with this difference only, by a ſlant direction of a ſhorter dibble preſſing the earth to the fibres.

I had the pleaſure of ſeeing that theſe generally ſucceeded; though not in a ſoil ſo well adapted for wheat, as that whence theſe cluſtered parcels were taken; yet they are now proſperous in ear, with a full fathomed grain, as thoſe in the field from whence they were extracted.

Perhaps expectation from the hoards of the field mice, which yet with us ſeems every year certain, would be a too precarious dependance: ſtill a certainty might be derived from thinning a proud produce (which would be mended by its reduction) or an unfailing one procured, by thickly ſtrewing as many pecks of wheat on a plot of ground as there are half acres in contemplation for planting; which quantity I am perſuaded would be more than ſufficient, were ſuch an aſſigned ſpace guarded from the depredation of birds, and the inroad of mice.

Perhaps it may not be unuſeful to give a ſketch of a hiſtory of this delving animal: not merely as illuſtrative of the foregoing plan of planting, but to point out an early mode of diminiſhing its numbers, which remove more ſeed corn than the huſbandman is aware of; I believe frequently more than the winged ravagers which he is often on his guard againſt. The ſketch of hiſtory I propoſe, is ſuggeſted by having been frequently of a party, with other ſchool lads, in traverſing the ſtubbles for the habitations of the field mice, from which excurſions we rarely returned without numerous captives. Our ſignal of diſcovery was a ſmall heap of mould, thrown ſometimes by, and oftentimes over the firſt entrance of their runs; generally at uncertain diſtances, there were other holes; ſometimes many ſcreened by thickets of ſtubble or weeds; theſe when we found we ſtopped up; and then traced their avenues from the firſt entrance through many winding paths, a little beneath the ſurface; at other times it led to a cell containing their neſt, ſometimes with callow young, but more frequently the half-grown progeny were gone off with the old pair to the extremity of their runs. To avoid what might be deemed a puerility of deſcription, I ſhall remark in point, that on one ſide of their avenue, in a larger ſpace than where their neſt was formed, there is ever to be found, if we ſought for it, a reſervoir of corn: I think I diſtinctly remember having nearly filled my hat with this treaſured proviſion.

The lately adopted mode of huſbandry has a certainty in unſettling, but not reducing the number of theſe corn-devourers; a means ſomewhat ſimilar to this boyiſh amuſement muſt be adopted to prevent their ravages. By the preſent mode of huſbandry their dwelling is broken in upon, but its inhabitants continue; when the plough breaks in upon their runs, they have a long period before it croſſes the extremity of the ſpace, when they muſt neceſſarily ſally; and it ſhould ſeem they more generally poſſeſs themſelves of the newly ſown fields of wheat, where they fill new magazines with its grain,* ſecure from deſtruction, ſafe from the talons of the owl; and here, after they have exhauſted their magazine, for months they find ſubſiſtence from the earlieſt green formation of the grain to its ſtate of maturation, at which period it is manifeſt they breed numerouſly. Our laws and the occupiers of land have ſet a price on a winged ſpecies of pillagers; while theſe ſcarcely obvious ſubterranean deſtroyers pillage with ſecret and more certain deſtruction; and the farmer's undoubted friend, and their natural enemy, the owl, is rarely protected, and too eaſily permitted to be wantonly deſtroyed.

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* In the intermediate period from the exhauſting of this corn, I have reaſon to believe their ſubſiſtence is acorns and beech maſts, having found, on the margin of a corn field, carried deep into the earth, a conſiderable quantity of the former; and laſt year had the mortification of obſerving, in a piece of land dropped with acorns almoſt every hole opened during a few nights.

But to drop theſe remarks; permit me to urge the principal object of this communication, by repeating, that a ſmall portion of wheat might be thickly ſown at the uſual period of ſowing, and tranſplanted early in the ſpring to ground to be prepared, and then ready for its reception; and if this be done with equal attention as wheat is dibbled, I am confirmed in opinion, from the foregoing experiment, that its produce will be little if any thing inferior to what reſults from a common ſown crop.

Your friend reſpectfully,

JOHN WAGSTAFFE.

ARTICLE XI.

On the Grafting Crab-Stocks, White-Thorns, &c. with Apples and Pears.

GENTLEMEN,

HAVING had a pleaſure in grafting, I ſome years ſince practiſed it upon ſome forward ſtems, in a layer of crab-thorn, the ſide of a new incloſure, which layer had been laid in about three years before; theſe ſtems I grafted with divers ſpecies of apples, and had the pleaſure of remarking, that about two-thirds of my grafts ſucceeded; from thence I entertained the expectation, that in a ſubſequent year or two the uningrafted might be cut down to form the quick hedge, and the ingrafted grow up at the requiſite diſtance, and form a row of uſeful trees; but my object was defeated by the ungenerous or ſelfiſh notice (I conceive) that was paid to my ſucceſs, as moſt of theſe grafted ſtocks (they being at a diſtance from my houſe) were taken away, and to preſerve the few remaining, I was obliged to take them up myſelf. Though ſtopt in this progreſs on my crab-tree hedge, at the approach of the ſpring of laſt year (1790) I pitched on a white-thorn hedge, of many years growth, the boundary of a garden, and marked at due diſtance many of its ſtrait and ſmooth-barked ſtems, and ingrafted them with ſcions from various pear-trees, which rather more generally ſucceeded than the apple ſcions in the firſt experiment; and in the courſe of the ſummer of that year, ſome of them ſhot from 24 to 40 inches. The ſucceſs of theſe excited me to a farther trial in the ſpring of this year, and with equal ſucceſs in their certainty of taking, though they are not quite equal to the luxuriancy of the ſummer ſhoot in their predeceſſors of the former year. Thoſe firſt ingrafted have improved on their former years vigour, in the additional length of their ſhoot, and increaſed thickneſs of their ſtem, while the ſize of their ſpurs indicates, to my conception, a probability of throwing out ſome bloſſoms in the enſuing ſpring. I may remark that one of the firſt ingrafted, I removed to the ſide of a wall, which removal it ſcarcely felt; as the firſt ſpring ſhoot was thirty-eight inches, and the next year's ſhoot meaſured twenty-nine inches; and this ſum of five feet ſeven inches from a white-thorn, that after many years growth had not ſhot in bole four feet from the ground. I am therefore perſuaded, on the foundation of theſe premiſes, that in any future incloſure of land, peculiarly thoſe incloſures that may be in contiguity to a habitation, hedges formed of either or both theſe ſpecies of thorns grafted, (and better fences of quick growth, I conceive, have not hitherto been planted) or the grafting at proper diſtances of their moſt promiſing and vigorous ſtems, may be highly uſeful. Any extent of a partitioned farm may be thus advantageouſly incloſed, and ſuch partition-hedges thus ingrafted. Perhaps the ſyſtem may be more advantageous in a ſmall than a large farm. Each of ſuch boundaries might be productive of fruit, in the ſame proportion with an equal number, and ſame ſpecies of trees planted in an orchard, and that without diminution of the growth of corn, or any reduction of ſummer or winter forage, and a more ſheltered paſturage might continue the cattle longer abroad. Thus the neceſſary, but commonly barren fences, may be rendered ſubſervient to a pleaſurable proſpect, and the ſupply of a conſiderable portion of food to numerous families; and in a year favourable to thoſe fruits, the making of a beverage grateful to moſt, neceſſary to many, and to thouſands of our fellow ſubjects their moſt natural draught.

I had more to have ſaid, relative to pears; but as theſe remarks are already extended to a length that might demand an apology, I ſhall reſpectfully poſtpone for your future judgment, what I wiſh further to offer reſpecting this fruit.

Norwich, Dec. Your friend,
26th, 1791. JOHN WAGSTAFFE.

ARTICLE XII.

On the ſaccharine Quality of Pears, Maple-Sugar, &c.

GENTLEMEN,

MY laſt letter to you, contains an account of certain experimented facts; by which the boundaries (the hedge-rows) of the field might be made uſeful to the ſupplying a large portion of edible fruit, without any injury to the fence, or diminution of its arable product.

But what I have now with ſubmiſſion to propoſe, concerning one ſpecies of fruit, viz. pears, is hitherto, I conceive, unexperimented; but which, under the encouragement of your ſociety, may become not merely a ſuccedaneum for ſugar; as in ſeveral inſtances, which I ſhall take the liberty of reciting, it has effectually ſupplied, but under ſomewhat of a chemical proceſs their ſaccharine extract may poſſibly be granulated into its abſolute ſubſtance.

The fluid extracted from a ſpecies of maple, perhaps two* of the maples of America, may be adduced in certain evidence, that ſugar is not the produce of the cane only, as it is generated from the maple tree in ſubſtance and quality not diſtinguiſhable from the product of that plant.

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* The acer ſaccharinum, and acer regundo.

Now the action of fire on pears, in the common culinary proceſs, gives even to the moſt auſtere of this fruit a ſaccharine quality: I have had different ſpecies of pears, ſome of them hard, ſtoney, and unpalatable, baked at different times; all of which, when duly baked, are more or leſs replete with this quality, inſomuch that their pulp, added in a proportion of about a fourth or fifth part to apples baked in ſmall pies, gives the required ſweetneſs, and it has ſeemed to me pleaſing to every palate as though ſweetened with ſugar: the ſame requiſite ſweetneſs is likewiſe communicated by the inſpiſſated juice in which they are baked, which juice or ſyrup is formed by a portion of beer or water put to the pears before they are put into the oven; and which ſeems to attract the native juice of the pear, in a larger proportion than what might flow if baked without an added fluid. This apparent ſyrup impreſſes the palate with the ſweetneſs of real ſugar, and which imparts to milk and the acid pulp of apples, its ſweet quality, not diſtinguiſhable in theſe ſubjects from what it is uſed for.

I therefore cannot but find myſelf intereſted, in earneſtly wiſhing that ſome encouragement might be given, to aſcertain whether ſuch a ſubſtance as ſugar is not obtainable from this luſcious fruit when thus prepared by fire. I need not add, what I conceive muſt appear from what has preceded, that in ſome inſtances it may ſerve as a ſuccedaneum to leſſen the conſumption of what is now, by the manner of its being obtained, become obnoxious to the public ſenſibility; and the extracting this quality from a fruit eaſily propagated, (congenial, if not native, to our climate) will in its conſequence be favourable to the intereſt as well as convenience of this kingdom.*

I wiſh to add to what I have mentioned in my former communication on this ſubject, of the mode in which this fruit may be propagated, and in addition to hawthorn ſtocks, obſerve, that they take with known facility upon the quince, the ſtocks of which may be eaſily propagated by their cuttings.

I farther wiſh to obſerve, that in uniſon with the ſpirit of diſintereſted patriotiſm, which hath diſtinguiſhed the Bath Society, they may find it eligible to encourage the reception of ſeeds or ſeminal plants of the acer ſaccharinum of America; and I may farther notice, that with a large ſample of refined ſugar, which I laſt ſummer received from thence, I received a paper of its ſeeds; two plants from which made their appearance in autumn, and I perſuade myſelf more will in the enſuing ſpring, as theſe ſeeds are in formation and genus like our maple ſeed, and I have no doubt but their habits are like them, and aſhen keys, which rarely vegetate until they have laid in the earth at leaſt one winter.

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* So far as this is connected with the political intereſt of the nation, deeper conſiderations are involved.

It may not be improper to ſubjoin an extract from a letter I received, with the above-mentioned ſugar and ſeeds, from a reſpectable character of Pennſylvania, (viz. Henry Drinker) on the progreſs their manufactory of ſugar had made, dated in a ſpring month of 1791. "Laſt year one perſon brought "to market from a neighbourhood not ten miles "ſquare, about fifty tierces of this (brown maple) "ſugar, weighing from twelve to fifteen tons. In "all probability the exertions and advances made "in this truly promiſing buſineſs, will produce ten "times the quantity ever before made."

I am, ſincerely and reſpectfully, &c.

Norwich, Feb. JOHN WAGSTAFFE.
24th, 1792.

ARTICLE XIII.

On Mangel-Wurzel, and other crops for Feeding Cattle.

TO THE SECRETARY.

DEAR SIR,

I AM ſorry and ſurprized to read Dr. J. Anderſon's letter in your 5th vol. p. 146, depreciating the root of Scarcity. It is very clear he had not the true ſort, as he ſays he bought it at a common ſeed ſhop. I have never yet been able to buy unmixed ſeed at any ſhop; always finding a great proportion of red and green beet; therefore I ſhall always raiſe my own ſeed, which requires very little trouble. Dr. Lettſom's deſcription and account of the true ſort is very accurate, but it is not worth while for a great farmer to gather the leaves; and it is very doubtful whether the root will increaſe more by taking away ſome of the leaves; if they fall and rot on the ground, they will preſerve moiſture, and be of ſervice there. But the great queſtion is as to the weight and value of the roots, for feeding horſes, cattle, ſheep, and hogs, or any of them, and whether they have any, and what advantage over the plants and roots before in uſe. This is a very copious ſubject, and I have not time to write fully on every part of it.

Doctor Anderſon, p. 150, ſays, "The fibres that "ſpring from the roots are ſo numerous and ſtrong "as to entangle a great deal of earth among them, "from which it is difficult to diſengage it; in wet "weather in winter, I do not ſee how it would be "poſſible, &c."

The root of the beet is entirely under ground, with ſtrong fibres like the turnip-rooted cabbage, but the true Mangel-Wurzel grows moſtly above the ground and is very eaſily drawn; and all thoſe animals will, when hungry, eat at firſt both root and leaves, but ſome creatures are at firſt averſe to new food, and will refuſe turnips, carrots, &c. which they afterwards become very fond of, ſo that no one ſhould judge and determine precipitately, as it is known that many ſheep will almoſt ſtarve before they will eat turnips. All writers do not ſufficiently diſtinguiſh the crops that beſt ſuit clay-land, ſtrong loam, and a light ſandy gravel; nor do they give diſtinct accounts of thoſe crops that may be drawn off the land at Michaelmas, in order to ſow wheat, and thoſe that will beſt ſtand the winter to be eaten off the land, which is the cheapeſt and moſt beneficial method, where the ſoil and ſituation is dry enough; but even in that caſe to raiſe potatoes, mangel-wurzel, carrots, or parſnips, in the ſummer fallows, and houſe ſuch crops before winter, near the fold yards for cattle, &c., will enable the farmer to keep more ſtock in winter to tread his ſtraw, and greatly increaſe that valuable thing on a farm called *dung* or *muck*. Having land of various ſorts, I practiſe a little of each, and find no difficulty in farming advantageouſly, but to get my workmen to be honeſt and diligent; as I can ſeldom ſpare time to look after them ſufficiently, the very beſt bailiff cannot or will not get as much done as the maſter can.

I ſee for the firſt time a ſhort account of the roota baga, and mowing cabbage, in Sir Tho. Beevor's letter, of which I wiſh for further information, and to obtain the ſeed next ſpring.

Sir Thomas ſeems to think Mangel-Wurzel of little or no ſuperior value, as it will not ſtand the froſt; which ſo very large a root, growing moſtly above the ground, cannot be expected to do; for roots are generally tender in proportion to their bulk, and the quickneſs of their growth: and it is ſo with trees, the ſloweſt growers are moſt hard and durable. I think that turnip-rooted cabbage ſtands the winter better than any other root in uſe, but it grows ſlowly, and never produces ſo large a crop as the other roots I have mentioned; and there is much trouble and difficulty in ſeparating the earth (if clammy and ſtiff) from the roots. On the whole I know no crop ſo certain, and ſo productive and uſeful, as potatoes; they will feed moſt, if not all kinds of ſtock.

Thoſe farmers who have moſt leiſure, ſhould aſcertain for their own government, in their reſpective ſoils and ſituation, the comparative degree of nouriſhment in a given weight of each root now in uſe, to feed every kind of farmer's ſtock; perhaps the leaſt periſhable, are at once the moſt ſolid and the moſt nouriſhing. Thoſe that abound with ſaccharine juices are certainly ſo; and ſuch are carrots and parſnips, which are difficult and uncertain to raiſe and keep free from weeds, and are only fit for a deep light ſoil.

I write in a hurry theſe general ideas, as they occur to me; if they are of any uſe I ſhall be glad.

And am, Sir,

Your obliged humble ſervant,

Lamnihangle,
July 19*th*, 1790.

J. FRANKLEN.

ARTICLE XIV.

On WOOL, SHEEP, *&c.*

TO THE SECRETARY.

SIR,

THE premium offered by the Bath Agricultural Society, for aſcertaining in the Weſtern Counties, by any experimental method, the beſt breed of Sheep in *Carcaſe* and *Wool*, ſeems perfectly judicious. Both theſe being equally eſſential to us: the one as adding to the ſupply of food; the other, to the means of induſtry obtaining it. The great miſtake of either, ſeparately attended to, I conjecture to be, the rearing on an enormous carcaſe a very coarſe, though long wool; which can only be applied to thoſe inferior manufactures, in which the ingenuity is ſo trivial, that the raw material makes nearly half the value of the fabrick; or the rearing on a ſmall carcaſe, of moderate meat, a ſmall quantity of that fine wool, ſo eſſential to the more delicate and artful manufactures. Wool of this ſort, at the rate of one to two pounds per ſheep, is collected here from the moſt ragged ramblers of our commons; and worth, when culled, half-a-crown a pound. The extent, ſhortneſs, and ſweetneſs of their feed, throwing the value into the ſmall fleece. But to encourage, or even permit, as in ſpite of our boaſted improvements is ſtill done, a collection of commonage, for affording a ſcanty pittance of ſhort feed, on a wide ramble, in order to gather in return a few fleeces, comparatively, of even the fineſt wool, would be ſupporting the boaſt of manufacture at the expence of food and population. At ſuch expence is the pride of Spain in her flocks now ſupported,—a policy far from enviable! That the fineſt broad-cloth has gradually decreaſed in goodneſs, and the narrow-cloth equally improved; is very palpable; and has probably ariſen from an increaſe by cultivation of that ſort of paſturage, which maintains a far greater number of the beſt ſheep, with ſome diminution in their fleece of finer wool;—too great a mixture of Spaniſh with Engliſh wool in the fabrick, in order to remedy this decline of our own, only procuring the uſual fineneſs at the expence of the old texture.

Since the improved culture of Norfolk and Suffolk, by converting extenſive ſheep-walks into fine incloſures of wheat, barley, clover, and turnips, with rye and tares; the wool of their provincial ſpecies has decreaſed in fineneſs; but been amply compenſated by the larger quantity raiſed on more numerous flocks, ſupporting and ſupported by the moſt improved agriculture; and at the ſame time ſupplying the market with ſome of the beſt winter mutton. The Suſſex South-Down breed, lately introduced into theſe counties, will feel the ſame effect of change, from ſhort, natural, and extenſive, to confined, ſucculent and artificial paſturage; and however profitable on the whole to the grazier, and beneficial to the community, as from the greater numbers ſupported on a given quantity of paſturage every late trial at preſent confirms; yet from the very beneficial mode of their ſupport, will gradually decline in the delicacy of their fleece, unleſs amply and annually ſupplied with additions to the flock from the original ſtock on the Downs. The wool of them in this neighbourhood has been ſold hitherto at 2d. and 3d. per pound lower than the ſame in Suſſex; and the wool of the ſecond year of importation from Suſſex, of the ſame ſheep, was not equal to that of the firſt.

I have been informed, by a very eminent manufacturer, that many years ſince an attempt, from a ſuppoſed ſimilarity of paſture, was made to introduce the long-wooled Lincolnſhire breed into the hundreds of Eſſex. The ſtaple was perfect at the firſt year, declined in the ſecond, and was loſt at the fifth. Repeated new ſupplies and croſſings might have kept up ſomewhat of the ſpecies, and ſettled at laſt a near approach to it. This is now trying here between the Norfolk and the South-Downs; and promiſes a breed that may unite very tolerable wool with a very fine carcaſe; equally proper for the fold and artificial paſturage; of a bulk ſuperior to the South-Downs, inferior to the Norfolk, but ſmaller in the bone, rounder in the form, tamer in diſpoſition, and thriving with equal profit on leſs food.

From the drawing and deſcription of the *Mouſſlon*, a wild ſheep of Tartary, and ſuppoſed by ſome naturaliſts to be the primitive race; the Norfolk, of all our ſpecies, ſeems moſt like this original. A lean long head, large curved horns, a riſing back-bone; when ſtanding, the fore-legs ſtraight, the hinder bent inwards, ſtrong in his whole make, agile in his movements, and in look wild and bold. Neither this, nor any other provincial ſort, have been attempted to be reared to an higher degree of perfection, by perſeverance in culling, preſerving, and occaſionally croſſing the more peculiarly perfect ones of the breed, till the Leiceſterſhire Society aſtoniſhed the kingdom, and I may ſay, all Europe, with their ſkill in the trial, their ſucceſs in the event, and the incredible return to their perſeverance and ſagacity, from the price paid by thoſe who moſt laudably aimed at ſharing in the pride and benefit of ſuch improvement. If any little artifice of trade hath been exerted in this extraordinary ſpeculation, the publick has probably ſhared fully in its reſult, by the ardour raiſed and excited to follow up ſuch an example, by equal attempts; which, if in other counties, more ſuitable for ſoil and ſituation for that purpoſe, can produce a finer ſtaple of wool on a carcaſe tolerably equivalent, will probably be ſtill more beneficial, in not only ſupplying the market with fine meat, but the manufactory with as fine wool.

That the extremeſt fineneſs in wool may, in ſome climates be united with the longeſt ſtaple, I have proof in a very ſmall quantity that I took from one of a few rough fleeces, brought as a little adventure by the Captain of an Eaſt-India ſhip from the Manillas; it is white as ſnow, and ſoft as ſilk; was bought by the very ingenious manufacturer at eight ſhillings the pound, and ſo readily acknowledged by him to have a far ſuperior value in the purpoſes to which, from its delicacy, it could extenſively be applied; (the advanced price of the raw material being comparatively as nothing to the value of the improved manufacture ingenuity can make of it;) that an order was given to collect in the Eaſt-Indies, at a more advanced price, any quantity that could be procured of the ſame. Yet ſuch was the influence of the *l'Eſprit du Corps*, (of which all profeſſions have their full ſhare) that even this inſtance did not convince the propriety of allowing, by an open ſale, the beſt price as the neceſſary encouragement for raiſing at home the beſt wool the ſoil and climate would allow, and of thus preventing the manufacturers of our coarſeſt and inartificial fabricks from aſſuming, to the reſtraint of every fine one, too large a portion of our wool; by the encouragement thus given to the grower, to conſider the quantity as more valuable than the quality of his fleece. A moſt glaring abſurdity! which, as far as legiſlative approbation of it can go, muſt continue, till that period, when a reform in our mode of election and repreſentation ſhall have, agreeably to the ſpirit of the conſtitution, reſtored to the landed intereſt an influence and energy equivalent to that of the manufacturers.

It is prouder to deſerve, than to receive publick encouragement; and from a taſte extremely promoted, in my opinion, among Country Gentlemen, by the writings of Arthur Young, eſq; of amuſing themſelves in agricultural purſuits, it ſeems as if the improvement of ſheep and wool would riſe under its oppreſſion, and be ſhewn to have deſerved a fairer treatment. Grazing ought ever to be the leading object in the farming of mere Gentlemen; and to them, that of ſheep will be the moſt amuſing, and the leaſt hazardous. The verieſt farmer, to a full flock muſt have, and extremely confide in, for every profit, a regular ſhepherd; the Gentleman needs do no more; and with a little additional allowance will, in this traffick, and this alone, ſtand on as ſafe footing for his amuſement, as his tenant does for his ſupport, againſt waſte, idleneſs, and impoſition. For the arable neceſſary for the ſupply of artificial feed during winter and ſpring, need be only in ſuch very moderate quantity, as to require little labour and expence; the moſt extenſive lawn is thus turfed by the cloſe bite, and thickened by the manure of the flock; the fineſt wool, for that ſhould certainly be a principal object, is gradually obtained; and the breed, found by experience moſt ſuitable to it, maintained on a ſoil kept by that very means in a conſtant ſtate of improvement. Excluſive of the private advantage of thus cultivating a demeſne in the moſt profitable mode, and the rational entertainment reſulting from experiment on an animal whoſe varieties are ſo great, as to receive from change of climate and food a perceptible diſtinction of form and qualities;

the general benefit of every county is immediately conſulted by the only means in which the common farmers can gain the chance at an eaſy charge, and ſpeedy rate, to have the beſt breeds gradually conveyed within their reach; and the kingdom thus ſtocked with what is moſt profitable under its preſent circumſtances.

To a conſiderable increaſe of population, we muſt certainly attribute the alarming report of a late committee, that this kingdom does not at preſent grow more corn than is neceſſary for its own conſumption. It is therefore in policy a criminal diſgrace to permit the waſtes to remain unincloſed, even where they are a tolerable ſheep-walk; when by an apportionment of waſte to individuals, under the preſent rotation of crops on arable land, flocks, upon the whole of ſuperior value, might be kept up in not inferior numbers; and with due encouragement, not leſs delicate in the wool. At the ſame time, they would contribute by the fold to raiſe corn for the ſupport of that multitude to which the manufacturing of their fleece affords employment, and in conſequence has added to the increaſe.

From the North of Scotland, where the climate renders grazing the only proper agriculture, we may expect, under the attention, induſtry, and expence of its patriot adventurers, the beſt breed for the fineſt fleece, and conſequently, I preſume, of leſs valuable carcaſe. But in England, to reach perfection in the latter, and approach to it in the former, is agreeable to our ſky and ſoil; neceſſary to our culture and population; and every encouragement and reward that rouſes competition for their mutual attainment, excited by publick virtue, and regulated by good ſenſe.

I am, reſpectfully, your's, &c.

CHARLES ONLEY.

1792.

ARTICLE XV.

On Planting, Grafting, and making Cyder.

TO THE SECRETARY.

SIR,

A Premium being offered by the Bath and Weſt of England Society for the beſt practical Eſſay, founded on experience, on raiſing Apple-Stocks, and the moſt ſucceſsful method of grafting and raiſing apple-trees for the orchard; together with the beſt eſſay on gathering apples, making them into cyder, and of managing that cyder until it ſhall become fit for uſe; induces me to tranſmit through your hands the method I have ſucceſsfully practiſed. If it ſhould be conſidered worthy the attention of the Society, I ſhall eſteem it the higheſt honour.

I am, Sir, your obedient ſervant,

J. N. MORSE.

Newent, *Dec.* 5, 1791.

After the apples are ground in a mill, and the juice for cyder (or if crabs, the verjuice) is preſſed from the rind, ſtalks, core and kernels; this is called the *muſt*, and ſhould be crumbled quite ſmall, and laid thin on a board floor to dry; for if it be laid thick, it will heat and deſtroy the vegetation of the kernels. To prevent its heating it ſhould often be turned with a malt-ſhovel.

Prepare a piece of ground by well digging and clearing from weeds, keeping the ſurface ſmooth; and in February or March lay the muſt thereon, and ſhovel-turn it in, that it may be two inches deep;

in about ſix weeks the young plants will appear, and muſt be kept clean from weeds; let them remain two or three years in the ſeed-beds, when they ſhould be taken up, and the tap-root cut off, as alſo ſome of the ſpreading branches. There now ſhould be another piece of ground prepared by double digging, wherein to tranſplant the ſtocks, laid out in beds four feet wide; plant them in rows acroſs the beds about one foot diſtance between the rows, and eight or ten inches diſtance in the rows; let them ſtand here three years, when they muſt muſt again be taken up, the roots and tops dreſt, and planted in rows about eighteen inches diſtance in the rows, and three feet between the rows; but four feet is better, as it will be more room to dig the ground between them, which ſhould be done at leaſt once a year, and kept clean from weeds, &c. by hoeing. Tranſplanting them twice, and pruning their roots, makes them root better and ſtronger, and commonly riſe with a wig or fibery root.

They are to ſtand in this nurſery until of ſufficient ſize to plant in orchards; ſome may be large enough when ten years old, others not until fourteen or fifteen; for they may be of very different ſizes, although ſown and planted at the ſame time. Here they are to be carefully trained up ſtraight, and pruned every year, by cutting off five or ſix of the largeſt knots or ſprays each year, and not many more in one year, as it would make the ſtock grow top-heavy and throw out more branches. This pruning ſhould be done in the ſpring ſeaſon, as the wounds will heal ſooneſt when the ſap is riſing; but if pruned in autumn or winter, the wounds will be long in healing, and be very black, and continue ſo for years.

Stocks ought to be ſtrong for planting orchards that they may the ſooner grow out of the way of cattle, which very often does them great injury. The ſize I chooſe to plant is from one inch and a quarter to one inch and a half in diameter at the grafting place; that is, about five feet ſix inches from the ground.

The method I purſue in planting orchards is, firſt lay out the field by ſetting up ſtakes equidiſtant; 20 or 22 yards from each other, I look upon as the beſt diſtance. After they are properly arranged, dig a hole conſiderably larger than will take the roots of the ſtock, that the earth may be ſoft and mellow for them to ſtrike therein more freely; have your ſtock ready with the roots and head pruned, particularly thoſe that were bruiſed in raiſing; place it upright in the hole. If ſome better mould, ſuch as ſtreet-ſhovelings, or a compoſt made with rotten dung, good mould and lime, (lime kills the ants, which are very deſtructive to ſtocks and trees,) were mixed with the ſoil to fill the hole, it will expedite the growth of the ſtock. Care ſhould be taken to fill up every vacancy between the roots, ſhaking the ſtock well whilſt filling; when filled, tread the earth down to the roots pretty hard, then have a ſtake four or five feet long driven ſideways in the ground leaning againſt the ſtock, pointing to the weſt wind, and firmly tie the ſtock to the ſtake with an ozier twig, placing a hayband between the ſtock and the ſtake, to prevent galling; this will prevent the wind ſhaking the ſtock, which very often injures it, and prevents its taking root. We ſhould then have ſix or eight black-thorns, pointed and ſtuck in the ground round the ſtock, reaching up to the head; theſe ſhould be tied in two places with twigs, to prevent cattle or ſheep from brouſing on, or rubbing, or peeling the ſtocks, which they are very apt to do, particularly young ſheep. I have had ſtocks peeled quite round by ſheep. The greaſe of the wool, when ſheep rubs againſt them, injures and retards their growth. Where wood is plenty, if three poſts be erected triangularly round the ſtock, and laths nailed to the poſts, it is the beſt fence. The ſtocks muſt now ſtand three years to take full root; at the expiration thoſe that have made free ſhoots ſhould be grafted with what ſort of apples the planter may pleaſe.

The method of grafting theſe large ſtocks is that in the clift, and performed as follows: firſt, with a ſaw cut off the head of the ſtock in a ſmooth place, at five feet or five feet ſix inches from the ground, pare it very ſmooth; then with a ſtrong knife and mallet cleave the ſtock about one and half inch down, a little on one ſide the heart of the ſtock; draw out the knife and put a wedge, driving it eaſy in the ſlit at the top to keep it a little open. Then with a knife made for that purpoſe, only open the ſlit about one and half inch long, half an inch wide on the rind, bringing it to a feather-edge near the heart, and to a point at the bottom of the ſlit. You muſt now have your grafts or ſcions ready, which muſt be cut with a keen knife very ſmooth to fit, and place it in the clift, ſo that the rind of the graft may exactly meet the rind of the ſtock. If the ſtock be large enough you may put another graft on the other ſide; when rightly placed, draw out the wedge at top, taking care not to diſplace the grafts, and the ſtock will cloſe in and hold faſt the grafts, when you muſt have ſome ſmooth clay mixed with fine hay, made into pledgets, and wind round the grafts and ſtock, making it ſmooth on the outſide; this will keep the wet and air out of the crown of the ſtock, and the ſun from exhauſting the ſap. The beſt time for performing this buſineſs is in February and March. Whip-grafting is practiſed with great ſucceſs, and generally on ſmall ſtocks about half an inch in diameter. The graft or ſcion nearly the ſize of the ſtock. This ſtock muſt be cut off in a ſloping direction, and the graft alſo, about one and half inch in length; pare both ſtock and graft ſmooth, and to fit each other, particularly betwixt the wood and rind, that the ſap may freely circulate; then cut a ſlit or tongue about half an inch in the ſcion upward, the ſame in the ſtock downward, to receive the tongue in the ſcion; in that manner fix the graft in the ſtock; immediately tie a ſtring of ſoft baſs or yarn round to keep the ſtock and graft in its right poſition, and immediately cover the place with ſome grafting clay. In May or June the bandages muſt be taken off.

Saddle-grafting is ſomewhat ſimilar; the ſtock being cut off ſloping, and the ſcion made to fit, and tied on as in whip-grafting.

Apples ſhould be gathered when full ripe, and will quit the tree by gentle ſhaking; if gathered before ripe the cyder will be rough and hard, and ſeldom pleaſant or good flavoured. Lay them on the ground in a fruit-yard, better if upon a gravel walk, as the wet will run from them and they will lie dry in the bottom; ſhould not lie thicker than ten or twelve inches, and are better kept without than within doors. Care ſhould be taken to place fruits of equal ripeneſs and good qualities by themſelves; for if of different ripeneſs the cyder will be apt to ferment too much, which will cauſe it to grow hard, and never be rich, full and fine-flavoured.

When the fruit is thoroughly mellow, it muſt be committed to the mill for the purpoſe of cyder-making, made with a ſtone chaſe and roller, ſomething ſimilar to a bark or a ſugar-mill. The roller drawn round the chaſe by a horſe. Here it ſhould be ground to a pulp, that no bit of apple may be ſeen, and until you cannot hold it in your hand, if you take a handful and ſqueeze it; the kernels and rind will then be well broken, and will give the liquor a fine flavour. Let it be put into tubs or hogſheads with one head out, and remain there two days, then preſs it through hair-cloths. I uſe fourteen or fifteen, putting about two pails full in each, turning up the ſides and corners; then put another on until the whole are filled, when preſs it with a ſcrew; put the juice into hogſheads; after it has been there a few days it will work and throw up a thick ſubſtance at the bung-hole, ſomewhat like barm, but of a darker colour; when this appears it generally is dropt fine, and ſhould be immediately rack'd into a clean caſk; for if the ſubſtance be ſuffered to fall, the grounds from the bottom will riſe, and the whole will be in a ferment and very foul, and perhaps muſt be rack'd three or four times before it can again be ſeparated and got fine; and will run a riſque of making the cyder harſh. So long as it remains fine and free from fermenting, it may remain in the caſk, but if it ferments much it ſhould be rack'd, and the grounds or lees* taken from it; it often requires four or five rackings. Cyder made with different ſorts of apples keeps beſt by breaking and mixing together; but this ſhould not be done until it is fine, when the proprietor may blend it to his palate. After the whole is done, a bung may be placed over the bung-hole, but ſhould not be cloſe ſtopt until February or March, when it it will be fit for ſale or uſe.

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* N. B. The lees may be dropt through a bag or bags of coarſe cloth, made in the form of a jelly-bag, with a hoop ſown round the top to hold about a pail full; by doing this very little cyder will be waſted, and the droppings added to the cyder will be a means to keep it from fermenting, and will alſo help the colour.

If cyder do not fine, ſome people uſe iſinglaſs. For one hogſhead of a hundred gallons beat about one ounce and a half and pull it to pieces; add to it about two quarts of liquor, and whiſk it together; next day add more liquor, and whiſk it: repeat this until it be diſſolved, and beaten fine. Rack your foul liquor, throw in the diſſolved glaſs, and ſtir it together with a ſtick. As ſoon as it drops fine, rack it off into a clean caſk.

Cyder ſhould not be bottled until ſixteen or eighteen months after it is made, as it would endanger the breaking the bottles. J. N. Morse.

Article XVI.

On a particular Kind of Apple, *&c.*

TO THE SECRETARY.

Sir,

ARTICLE xxth of the 4th volume of your Society's Papers is ſurely intereſting to the planters of orchards. Your judicious comment in a note, and humane invitations to the publick to furniſh ſcions of ſuch different fruit as may contribute to the general good, by improving the ſtock of ſo valuable an article, merits praiſe.—If the following character of the fruit of a certain apple-tree be thought worthy of your Society's attention, a few ſcions are at their ſervice.

Having purchaſed a ſmall freehold in the year 1777, the laſt proprietor informed me there was a certain tree in the orchard (which orchard in general was in a deplorable ſtate) of ſo excellent a kind, that they could always ſell the fruit at an advanced price; nay, was ſo good as to require no ſugar when made into a pye. Being a little hard of belief towards this laſt aſſertion, trial at leaſt ought to be made, which was done by adding the uſual ſpices, reſerving only the ſugar. The conſequence was, the paſtry was ſo well reliſhed, that this apple to this day maintains its ſuperiority at table, without the addition of a grain of ſugar.* I requeſted an eminent nurſeryman in this neighbourhood to examine the tree and the fruit, and inform me, if he could, what kind it was. Of the tree he could form no gueſs; having taſted the fruit, he called it the Orange Pippin, the ſhape being ſimilar to an old fruit of that name, and its colour when ripe ſomething reſembling an orange. He begged a few ſcions, (the kind it ſhould ſeem was not general) and has diſperſed ſince, over the country, great numbers. The ſhape of the tree is the beſt poſſible for an apple, its branches extending horizontally, and when loaden with fruit, bending downwards. It is a conſtant and generally productive bearer; I think never quite barren. As to the flavour of its fruit, the neareſt I can compare it to, is that of the Ribſtone Pippin, but not quite ſo high (i. e. inferior probably.) After Chriſtmas it loſes ſome of its excellencies, but will keep ſound till the ſeaſon of gooſeberries.

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* *Quere*, If a fair trial were made, would not many kinds of our beſt table-fruit do the ſame?

It is no bad œconomy, when any particular plant is found congenial to, or to flouriſh in a certain ſoil, to cultivate that plant. As this tree agreed ſo well with my ground, and the fruit had ſo many recommendations of its own, I determined that this apple (retaining a few varieties) ſhould be chiefly cultivated here. The young plants are but lately become bearers. I am ſorry to obſerve, that although the fruit is good, it is yet inferior to the parent ſtock: here then appears a degeneracy. I have not yet learned how it has anſwered in other places. Such as it is, a few ſcions are at the Society's ſervice, by ſending directions how and whither they may be ſent, in a line directed to, Sir,

Your obedient ſervant,

JOHN HOLT.

Walton near Liverpool, Jan. 3, 1790.

☞ This gentleman's offer was thankfully accepted, and the ſcions diſpoſed of to gentlemen moſt likely to propagate them. We take this opportunity of repeating, that if any gentlemen who may think themſelves poſſeſſed of ſuperior fruits, will be ſo obliging as to offer ſcions to the publick, through the medium of the Secretary of this Society, it will be deemed an eſſential ſervice.

ARTICLE XVII.

On Tranſplanting WHEAT, *&c.*

TO THE SECRETARY.

SIR,

I Beg leave to offer a few thoughts upon dividing and tranſplanting Wheat, on which ſubject a premium has been offered, upon two varied experiments, and which originated, it may be preſumed, from the amazing quantity raiſed from a ſingle grain of corn, repeatedly divided and tranſplanted, as recorded in your tranſactions; I cannot refer to the particular volume, not being in poſſeſſion of the work.*

It is a fact well known, that to eſtabliſh ſome favourite hypotheſis, or in purſuit of ſome favourite ſcheme, perſeverance in the proſecution has been almoſt incredible, to enſure a ſucceſsful iſſue: hence different effects from different motives. In other words, when reduced to common practice in the rude hands of the labourer, who has no other motive to action than to obtain the hire of his induſtry, the effects are not always favourable. The wiſdom of providence has ordained, that the moſt uſeful knowledge is with leaſt difficulty obtained; and the moſt uſeful practices moſt eaſily executed.

The act of dividing a root of corn, which conſiſts of ſeveral branches, requires no ſmall degree of delicacy in the operation, to preſerve ſome part of the original root to each ſeparately divided ſtem. To this difficulty may be added, the chance of obtaining a proper and ſeaſonable opportunity; without moiſture either from ſhowers or watering, the plants muſt inevitably periſh under the operation: under the moſt favourable circumſtances, the plants require ſome portion of time to acquire their former health and vigour, conſequently this check, according to the number of repetitions, will proportionably retard the maturity of the grain. Nor is this reaſoning from theory, but actual experience; and that the cultivator of this extraordinary produce was well aware of theſe facts, is evident: for the grain of wheat was committed to the earth, if I recollect truly, in June, four months previous to the natural ſeaſon of ſowing this ſpecies of grain; ſo that it had this length of time, or nearly two ſeaſons, or one ſummer in advance, as it were, to aid theſe ſeveral checks or drawbacks on vegetation.

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* Vol. iii. page 388.

From the foregoing premiſes it ſhould ſeem, that although the fact may be practicable by the diligently curious, it can never become uſeful to the practical cultivator. Far from depreciating theſe ingenious trials of perſevering induſtry and ſkill; they may be productive of utility, and ought to be recorded. Hints generate hints; and the experiment under conſideration has produced the following, of ſeparating the different branches from a ſingle potatoe, and replanting each ſtem thus divided, and taken from the original ſet. Whether this practice will be productive of any good, remains to be aſcertained, as this experiment is only in proceſs; but this I already obſerve, that the ſtems ſeparate without difficulty, (no leſs than fourteen from *one* root) and vegetate again with vigour; more ſo than any ſpecies of grain I have hitherto divided or tranſplanted. It cannot be doubted that a moiſt ſeaſon was adopted.

I cannot forbear mentioning one method of tranſplanting wheat, which may be worthy the attention of the induſtrious labourer, to whom a few hours extra work may not be an object equal to the ſaving of purchaſing ſeed, or ſaving the grain for the uſe of his family: it was this ſpecies of œconomy that pointed out that uſeful method of dibbling wheat, firſt practiſed in Norfolk: I mean collecting ſeedling plants from the wheat-ſtubbles which have been ſelf-ſown the preceding autumn. Theſe plants are not of the leaſt utility to the farmer, but are ſometimes, by hurricanes or other accidents, ſo abundant on the ground as to afford ſufficient ſtock to plant many acres. It may happen the autumnal ſeaſon is not favourable to the ſeed harveſt, the land may be wet, &c. In ſuch caſes theſe ſeedling plants, which would otherwiſe be loſt, may be rendered extremely uſeful. Under theſe circumſtances, I planted a piece of potatoe ground in March laſt with ſeedling plants, collected from a wheat-ſtubble, which at this preſent juncture have a moſt promiſing aſpect.

I wiſh you health to ſee the Lancaſhire apple flouriſh in your neighbourhood.

And am, Sir,

With much eſteem,

Your obedient ſervant,

J. HOLT.

Walton, near Liverpool,
May 31, 1790.

Article VIII.

On the Loſs of Weight in Grain, &c.

TO THE SECRETARY.

Dear Sir,

FROM a variety of experiments made upon evaporation, I have ſelected and ſent the following, as falling more properly under the plan of your Society. The facts may afford ſome uſeful hints to the farmer, and ſerve to inſtruct him, that beſides the rats, mice, and other vermin, he has a ſecret and ſilent, but never-ceaſing enemy, continually making depredations upon his property, as the following experiments, to aſcertain the loſs that grain, eſpecially wheat, ſuſtains, will verify.

EXPERIMENT I.

AUGUST 31ſt, 1789.

Gathered and rubbed a few ears of wheat during a glowing ſun, which being immediately put into the ſcales weighed 2 ounces 11 drams. October the 18th, being put into the ſcales again, then weighed 2 ounces 7 drams. The loſs of weight per buſhel of 70 pounds (the cuſtomary meaſure of this neighbourhood) is 6 pounds, 8 ounces, and 3 drams, nearly, or almoſt one-tenth of the whole in 49 days. But this is the greateſt loſs that grain can poſſibly ſuſtain, which, although perfectly ripe, had neither the advantage of being dried in the ſun after being reaped, nor had it undergone the proceſs of fermentation after being got together.——N. B. Thirty-two grains weighed one penny-weight.

BARLEY.

EXP. II. *Sept.* 2. Under the ſame circumſtances put into the ſcales 2 ounces and 2 drams of barley;

which, being tried again Oct. the 18th, weighed 1 ounce and 12 drams, or, at 60 pounds to the buſhel, had loſt 8 pounds, 4 ounces, and 22 drams, or about one ſeventh of the whole in forty-ſeven days.

N. B. Twenty-four grains of this barley weighed one pennyweight two grains, ſo that this corn muſt have been ſofter, or in a leſs matured ſtate, than the grains of wheat in the firſt experiment. Since 24 grains of plump wheat are reckoned to weigh one pennyweight, and hence the ſtandard of that weight; whereas we ſee the pennyweight took 32 grains.

WHEAT.

EXP. III. *Oct. 22d.* Put into the ſcales ſix ounces three drams, which in 24 days loſt three drams, or after the rate of two pounds one ounce, fifteen drams, per buſhel.

WHEAT.

EXP. IV. *Jan. 8th,* 1790. Took two ounces two drams of wheat, which in thirty-two days loſt after the rate of 2 pounds 15 drams per buſhel.

From theſe experiments it appears that the decreaſe in weight was pretty regular from the time of harveſt, and the time taken in aſcertaining the loſs of each quantity: in other words, that the ſum of the matter evaporated becomes gradually leſs according to the length of time kept on hand, but proves that the ſooner the crop is brought to market, *ceteris paribus*, the greater is the advantage to the farmer.

N.B. The number of grains to a pennyweight in the two laſt experiments was omitted, or forgotten to be regiſtered. After the loſs ſuſtained in the experiment No. 4 had been aſcertained, the grain was expoſed a few minutes before the fire, and when weighed again had loſt three pennyweights.

If ſuch be the loſs in weight of grain, we may conclude the potatoe, which evidently contains a conſiderable quantity of water, muſt alſo ſuffer by evaporation, although its quality may by this loſs be improved.

Aug. 27*th*, 1789. Took a pint-eye potatoe, freſh from the earth and well cleaned, which weighed two ounces, nine dwts. and twenty grains; the day following it had loſt twenty grains; two days after twenty-ſix grains; in four days more thirty-one grains; in ten days more, or at the end of ſeventeen days, it had loſt forty grains. But we obſerve it loſt as much the firſt day, as the laſt ſixteen; in three days, ſix grains; whereas in thirteen days more, it only loſt fourteen grains.

If ſuch be the progreſs of nature, we may naturally conclude this effect is increaſed by the culinary proceſs. A potatoe that weighed 2 ounces, 7 dwts. and 5 grains, in its natural ſtate, after being roaſted only weighed 1 ounce, 5 dwts. another before being put into water weighed 2 ounces, 5 dwts. and 6 grains, but immediately after being boiled, had loſt 54 grains.

Leſt you ſhould fear I am entering upon a ſyſtem of cookery, I abruptly conclude.

Sir,

Your obedient ſervant,

JOHN HOLT.

Walton, near Liverpool,
Nov. 1ſt, 1790.

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ARTICLE XIX.

Obſervations on the Subjects propoſed by the Bath Society, in their Circular Letter of July 30th, 1791, for Enquiry of the ſeveral Perſons to whom the ſaid Letter was addreſſed.

Extract from CIRCULAR LETTER.

" The Society has been informed, that great damages " have been done to many Fir Plantations (particu- " larly among the Scotch firs) by ſquirrels preying " upon the bark."

" Generally done in the ſpring, when the winter hoards " of theſe little animals are exhauſted."

" The injury has been generally done, by gnawing the " bark quite round the leader of the tree, a few feet " below the top, the ſquirrels chewing it for the ſake " of the moiſture, and dropping the woody part like " ſaw-duſt on the ground."

" The tree thus barked decays in that part, loſes its top " by the firſt rough wind, and of courſe gradually " periſhes.——The ſociety wiſh to know, how far " ſuch complaint is general."

OBSERVATIONS.

MANY hundred Scotch firs were damaged by the ſquirrels, in Lord Bath's plantations, in the ſpring of 1788. Some few have been damaged ſince, but not in any degree equal to the extent as at that time.

Theſe trees (which were then about 16 years old) were gnawed round the ſtem, about 10 or 12 feet from the ground, in the manner deſcribed in the Society's letter.

The trees lingered through that and part of the next year; but the bark immediately below the wound, ſwelling and forming a callous, the greateſt part of the trees were broken off by the winds in the autumn and winter of 1789.

I made the following obſervations, on the kind of trees the ſquirrels chiefly preyed on, and the nature of the plantations in which thoſe trees grew.

They attacked only Scotch firs, though ſpruce, ſilver, and larch, were in the ſame plantation. They chiefly fell upon the moſt luxuriant and faſteſt growing trees, whoſe bark was thinneſt, and of courſe moſt full of turpentine. They ſpared the rugged barked trees, or where they began upon ſuch trees, they left them without barking them round. The time was in March and April; and the plantation was near a large native foreſt, where the ſquirrels abounded, and from which they were probably allured by the number of fir cones, of which it is well known they are very fond, and when they had finiſhed the cones, they began upon the bark.

Luckily the plantation where the miſchief was done, had its due proportion of beeches and other foreſt trees, ſo that the loſs was not long felt, as the Scotch firs, which were only planted for nurſes to the foreſt trees, would have been taken away in a few years, if this accident had not happened.

The remedy is obvious and not difficult, viz. to ſhoot the ſquirrels, as they are eaſily ſeen and heard when about this work; but they muſt be watched cloſely the moment they begin, as it is aſtoniſhing what a number of trees a few of them will ſpoil in two or three days.

There is this ſource of comfort to planters, viz. that in large plantations, where foreſt trees, ſuch as beech, oak, &c. will grow, ſuch trees ſhould by all means be planted, and ſufficiently thick to form a wood, when their nurſes the Scotch firs are removed. For although Scotch firs are more profitable, and the timber really more uſeful, than is generally underſtood, yet as the period of their growth, or at leaſt of their beauty, is much ſhorter than that of deciduous trees, proviſion ſhould be made for the permanency of the plantation as well as for its preſent beauty; and in plantations where ſcarce any thing but Scotch firs will grow, and ſuch ſoils there are, the ſquirrels, if any ſhould find their way thither, cannot live through one winter for want of food, and of courſe may eaſily be kept under; beſides (as was before obſerved) the bark of the firs growing on ſuch ſoils, will be ſo hard and rugged, that the ſquirrels will be able to do very little miſchief.

The ſociety will, I hope, excuſe my giving my opinion (the reſult of my own experience and obſervations) on modern plantations in general.

The fault is not ſo much in the kind of trees uſually planted, for all trees are fit for ſomething or other, and the worſt may be applied to ſave the uſe in many caſes of thoſe that are better; and in general *that* is the moſt proper kind of tree to plant, which agrees beſt with the ſoil and ſituation; but the great fault has been owing to the mode of making the plantations, and in the management of them afterwards. We do not ſufficiently follow nature as our guide. We do not firſt conſider what kind of a wood we wiſh to have, and then take the methods which nature points out to get ſuch a wood. If we wiſh to have a grove of large ſpreading trees, where the ſoil and ſheltered ſituation warrant the probability of the ſucceſs of ſuch an attempt, we muſt not plant our trees ſo thick as to deprive them of all their under branches, on which the beauty of every tree, taken individually, depends, and thereby make a wood of poles inſtead of trees.

If we plant to cover a bleak, expoſed, barren ſpot of ground, where, if we do not plant the trees thick, it is uſeleſs to plant at all, and where of courſe the under branches of the trees cannot be preſerved; we muſt not make our plantations, as is too frequently done, of ſo ſmall a ſize, that, inſtead of being (as they are intended to be) a ſhelter to the adjacent country, the trees will not even ſhelter each other from the winds, but become moſſy and ſtunted, and catch colds which they never recover. And when the owner has flattered himſelf for 30 or 40 years, that he ſhall live to ſee the fruits of his labour come to perfection, he finds he has it all to do over again.

The great damage generally done to plantations, next to that of ſuffering them to be eaten up by cattle, which is not uncommon, is by, the cold winds (in this county the ſouth-weſtern) which affects them moſt ſeriouſly, when they begin to throw off their lower branches, and leave their bodies naked. To this period we ought to look forward in all our plantations. Till that time, trees may be made to grow and thrive in almoſt any ſituation; but ſhelter is perhaps of more conſequence than ſoil to the growth of trees. If that cannot be obtained from the natural ſituation, we muſt make the plantations a ſhelter to themſelves. In the firſt place we muſt make them big enough, that the wind may not blow through them *when grown up*; and ſecondly we muſt thin them early and often, and inure them gradually to bear that degree of cold, which it will be neceſſary for them to bear, when nature has deprived then of their under branches, and left their bodies naked. Plantations ſo made and managed, will prove beneficial to the owner, ornamental to the country, and uſeful to the community.

Obſervations on the ſuppoſed Neglect and Scarcity of Oak Timber.

Extract from the Society's Letter.

" AS from the ſuppoſed neglect and ſcarcity of Oak " Timber, planting and the preſervation of woods is " become an object of great national conſequence. " The ſociety wiſh to know your ſentiments on the

"preſent ſtate of oak plantations in general, and how
"far you think the *larch*, or any other tree capable
"of being ſubſtituted for *oak* in any branch of ſhip
"building, has been attentively cultivated."

The following obſervations reſulting from an experience of near 30 *years, and that a very extenſive one, not only in planting, but in cutting down and converting every kind of timber, as well for the navy as for home uſes, are reſpectfully offered to the Society.*

OBSERVATIONS.

TIMBER is an article of commerce. The ſcarcity of any article of commerce is uſually owing to the increaſed demand, or the leſſened production of that article. The increaſed demand is uſually followed by an increaſed attention to the production. The *ſcarcity* of any article, in itſelf indiſpenſible, and *the neglect* in the production of that article, is therefore a paradox in commerce. To prove that the ſcarcity of oak timber is a chimæra, and to convince every *Briton* that the navy, *the pride and bulwark of his iſle*, will never want *Engliſh oak* to enable it to keep up that ſuperiority it has always held among maritime powers, will not be I truſt a difficult taſk. I am ſure it will not be unacceptable to the ſociety, the great object of whoſe inſtitution is, "*that this generation ſhall not leave the world worſe than they found it.*"

To confine our obſervations at preſent to oak timber for ſhip-building; if ſuch timber were really ſcarce, the price would riſe. The contrary is the fact. In the merchants yards, futtocks and large knees are ſunk conſiderably in value ſince the concluſion of the war; and yet theſe are the pieces the moſt in requeſt, and the moſt difficult to procure. Government have not actually altered the Dock-yard prices, for more than 20 years paſt; but they have virtually *ſunk them of late*, by increaſing the metings of the timber which they take in. That is, they now reject timber under a certain ſize, which till of late they were obliged to take to induce the dealers to bring them the large pieces they wanted. They now take the large pieces at the old price, and reject the ſmall. The price of ſhip-timber is therefore really leſs than at the concluſion of the laſt war; and as we have now a proſpect of a long continuance of peace, there is every probability of its being ſtill lower, or at leaſt not advancing, eſpecially as it is well known that our navy is in ſuch a ſtate, that, even admitting we were again involved in a war, it would want only common repairs for ſome years to come.

There is now in the county of Hants alone, timber enough to ſupply nearly the common conſumption of Porſmouth yard, and in the other mariti counties nearly ſufficient for all the reſt of the yard But a great deal of oak in diſtant parts of the king dom, will now find its way to the ſea-ports, by means of the many canals in the kingdom, which formerly were conſumed only in the domeſtick uſes of the county where it grew, while thoſe ſame canals will bring back deal at a cheaper price to ſupply thoſe domeſtick uſes.

The uſes of oak leſſen every day. Houſes were formerly built almoſt entirely with oak timber; but now the innumerable new houſes in Bath, Briſtol, London, Mancheſter, Birmingham, &c. have very little oak in them. Deal anſwers the purpoſe at a much cheaper rate.* The great fear would be, provided that oak was only wanted for ſhip-building, that the price of it would ſink ſo low as to make it hardly worth growing. Even now it would be difficult to find almoſt any kind of timber, that does not pay better for planting than oak; but luckily there are thouſands of acres in this kingdom, where *oak* is *the weed of the country*, and grows without planting; and luckily there are two or three purpoſes, for which oak timber is wanted beſides ſhip-building, which will make it worth the owners while to encourage the growth of it in ſoils of that deſcription, and will keep up its price in peace as well as in war.

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* In conſequence of the numerous buildings alluded to, or from an increaſed foreign demand, or ſcarcity in the Northern countries, or perhaps from a combination of all thoſe cauſes, fir timber is now ſo much advanced, that the cultivation of oak, with a view to building uſes, ſeems to preſent itſelf again as an object. And it is probable that the beſt ſpecies of fir, which grow faſter, will not be raiſed in vain for the common uſes of home conſumption.

Firſt; The continual and increaſing demand for bark for tanning, which is now ſo great, that the bark is worth in inland ſituations, nearly one-third of the value of the timber; and, if the timber is ſmall and near the ſea-coaſt, nearly one-half.

Secondly; The amazing and increaſing demand for beer caſks, of which the conſumption is increaſed to an aſtoniſhing degree, And

Thirdly; The demand for laths and ſpokes for wheels, with which the market is never overſtocked.

Theſe uſes of oak timber, viz. for barrels, ſpokes, and laths, requiring only the ſtraiteſt timber, will leave the crooked pieces, *the great deſiderata of ſhip-building*, purpoſely for that uſe; and as by means of the canals, thoſe pieces can be got to the ſea-ports as cheap from the inland counties as by land-carriage from the maritime counties, there will be no danger of want of oak timber, either in the King's or the merchants' yards; or that the price of it will riſe higher than its real value, compared with the value of other timber.

But admitting the ſcarcity of oak *ever* to be real, I beg leave to ſtate to the ſociety my reaſons for thinking that larch will never be a ſubſtitute for oak in ſhip-building.

The ſtrength of a ſhip depends on the tightneſs and ſolidity of its conſtruction. The ſtrait pieces of timber uſed in a ſhip are very few, the greateſt part are crooked. And to attain the neceſſary tightneſs and ſolidity of the whole, thoſe crooked pieces muſt grow in the very ſhape they are to form in the ſhip. No Engliſh timber admits of that variety of ſhape but oak; and if there were any that did, there is no other that will ſtand wet and dry.

Larch is a *ſtrait-grained* tree, and cannot be brought into any of the *crooked* uſes of a ſhip, nor will it ſtand wet and dry for planking. It may ſupply the place of deal for flooring; but the price of foreign deal at the ſea-ports will probably be always lower than the price at which larch will be worth for country uſes, where it grows.

The larch is a beautiful tree, and doubtleſs a very uſeful tree; but I much queſtion whether more has not been ſaid of it than it deſerves, at the ſame time that the poor Scotch firs, with all their faults, have been depreciated much below *their* deſerts; though they will grow on land whereon larch will not grow.

The larch will certainly anſwer all the purpoſes of fir for timber, but it is not ſo ſtrong nor ſo heavy as Scotch fir. I have cut a ſolid foot of each out of two trees of equal ſizes and equal ages; the larch weighed only 51, and the fir 60lb.; and if our Scotch firs grew as thick together, as they do abroad, as we may ſee by the uſers which are uſed for ſcaffolding, it would be a much ſtronger grained timber than our's generally is;—only the quickneſs of the growth and the bigneſs of the knots make it otherwiſe. The Engliſh grown ſpruce and ſilver fir timber are fully equal to any white deal we get from abroad. The Marquis of Bath has uſed Engliſh grown fir, for almoſt all domeſtick purpoſes, in the dry, for 20 years paſt, and finds no wood except oak equal to it; and we have an inſtance of a cart-houſe, which has been built with Engliſh grown fir upwards of 70 years, now almoſt as perfect as when new.

If therefore the uſes of oak timber for domeſtick purpoſes can, as undoubtedly many of them can, be ſupplied by other timber, of which there are ſuch amazing quantities daily planted; I think we need not be afraid that the ſcarcity of oak timber for ſhip-building will ever be alarming. Let us at leaſt firſt be convinced, that *the price riſes*, before we believe that there is any ſcarcity at all. For it is as evident, as that effect follows cauſe, that there can be no real ſcarcity, ſo long as the price continues nearly the ſame, much more when that of the crooked pieces, ſo indiſpenſably neceſſary in the conſtruction of a ſhip, are ſunk from 25 to 30 per cent.

The ſubject of trees and timber has been my favourite ſtudy, and my daily employ, for near 30 years. The number of trees that have been planted under my direction, and the quantity of timber of which I have had the diſpoſal, have been greater than can fall to the lot of many men. Any communications which the ſociety may at any time wiſh on this ſubject, ſhall be given with the greateſt pleaſure,

By their and your obedient ſervant,

THOMAS DAVIS.

P. S. Since writing the above letter, I have ſeen large quantities of oak timber in Devon and Cornwall, cut down merely on account of the high price of bark; the buyers of which offered to ſell the timber again, as ſoon as they had ſtripped (viz. barked) it, from 6d. down to 4d. a foot; and yet this timber was fit for building ſmall coaſting veſſels, for which the demand increaſes, as that for ſhips of war decreaſes. Does this look like a ſcarcity?

If there ſhould be a likelihood that the vaſt demand for bark, particularly in Ireland, will occaſion much timber to be cut in waſte, merely for the bark, the ſociety would do ſervice to the publick, by offering *a very handſome reward* for a chemical preparation, to anſwer the purpoſes of oak bark in tanning leather. It has been many times attempted with ſome degree of ſucceſs; but the principal objection has been, that the price would be too great for general uſe; but when it is conſidered that the ſame bark which ſells in England at 4l. a ton, is now worth more than 9l. in Ireland; a chemical preparation which would anſwer as well as bark, after the rate of 6l. per ton, would ſerve Ireland, and keep the Engliſh bark at home (where there is no fear of a demand for it) at the price at which it is now ſold.

ARTICLE XX.

On Smut in Wheat; new method of ſowing by Hand, &c.

TO THE SECRETARY.

SIR,

IN the 5th volume of the Society's Papers, Art. 17, I obſerve an anonymous writer on the ſmut in wheat, who profeſſes to have made it a ſubject of enquiry, aſſert, it is cauſed by a cold wet ſeaſon when in bloom. He muſt have been very inattentive not to have obſerved, that ſmutty ears not only never blow in any ſeaſon, but have never any ſigns of that which, appearing on wheat ears, is called bloom, and which in ears of wheat are to be found incloſed, by opening the chaff before blowing; but if the weather at that time prove cold and unfavourable, ſo much as to prevent the chaff opening and the bloom from being diſcharged, no grain is produced therein, as it cauſes what is here technically called a *miſs* in the ear: therefore if the weather has any thing to do with the cauſe of ſmut, (which I doubt) it certainly muſt be in a much earlier ſtate of vegetation than your correſpondent ſuppoſes; for the ſmut is to be diſcovered as ſoon as the wheat is podded; and immediately on the burſting of the pod, if the ear be picked out, it will be found to contain a very ſmall green bud; and if that ear (before ever having been expoſed to the atmoſphere) be rubbed on the hand, it will give out that diſagreeable odour, of which we are very ſenſible in the more advanced ſtage of it, but contains not the leaſt appearrance of what is deemed bloom in a wheat ear; therefore, I apprehend, his ſmutty wheat in the cold wet ſummer proceeded more from the preceding damp harveſt, whereby the ſeed was more infected with the diſeaſe (which I have obſerved) than from the ſeaſon in which it grew. I am willing to admit his argument, that none but he who can repel blights can reward the huſbandman; but hope that the ſociety will not on ſuch grounds ſtop their enquiries. The phyſician might on this principle withhold his aid; for we all know that man muſt die, but nobody knows when, and all wiſh to poſtpone the day. He is very far from having proved that blight is the cauſe of ſmut: from many years cloſe attention to this enquiry, I am certain it generally is not; for I cannot cauſe a blight, but certainly can the ſmut in wheat, either in a wet or dry ſummer. I never diſcovered any difference in the roots or knots, but it is to be diſtinguiſhed by an attentive obſerver, before it comes to ear, having more the appearance of a wild oat than wheat, the leaf is of a darker green, and ſo is the ear on its firſt appearance.

Sir T. Beevor's drill roller is, I think, an implement well adapted for wheat which requires a cloſe bottom, but I ſhould prefer drilling for barley, as it delights in a warm looſe ſituation; but as the well looking of Sir T. Beevor's work depends in a great meaſure on the corn being well ſown, and as through moſt countries, I have obſerved that buſineſs is generally badly done, I am induced to ſend you what I think the greateſt improvement the old huſbandry has met with in this century; (I have not ſeen it practiſed elſewhere, nor any account of it in the agricultural publications) that is to ſay, the *new method of ſowing by hand*; the old method was to ſow in warps, viz. 20 furrows at the time, proceeding down the right hand ſide of the warp, and returning on the left ſide, caſting the ſeed with the right hand acroſs the warp, the whole was finiſhed, and probably, as either going or returning the ſeedſman was obliged to caſt againſt the wind, the work was badly done. By the new method, the ſeedſman always caſts before the wind, takes a leſs quantity in his hand, and advances ſeven furrows each time, which is about three times over a warp, exactly as tiles are placed; if in the beginning he proceeds to ſow with his right hand, at the end he advances ſeven furrows and returns ſowing with his left hand, proceeding alternately with his right and left hands, till the field is finiſhed; the only care required is to deliver the corn thin on the mark, by which method it is in all weathers accurately ſown, and not liable to be hand-platted.

I have for ſeveral years drilled the greateſt part of my corn, and have experienced that ſeven inches is the moſt profitable diſtance for the farmer; nine and ten inches is too far (except on very rich land) as in thin land, the corn will be too much expoſed to weeds and injury by dry weather. It was my *former* practice, and I am ſatisfied I was right when I relinquiſhed it. Nothing has depreſſed the ſpirit for drilling ſo much, as the fallacious idea held forth and maintained by its enthuſiaſtick advocates, that large crops may be obtained with little ſeed, and rows at a great diſtance; the deſpicable crops I have ſeen from ſuch management, could not eſcape the obſervation and cenſure of thoſe of another opinion, when a generous diſtribution of double the quantity of ſeed would not only have prevented the ridicule, but have been doubly advantageous to the theoriſt. Some ſeed may no doubt be ſaved, and enough to pay the expence of drilling; I never drill leſs than two buſhels of wheat, ſeven inch furrows, and three and half barley; whatever may have been ſaid to the contrary, I never found the old farmers ſo ſhallow pated, as to withhold themſelves from what they *ſaw* a ſucceſsful practice, conſequently this mode of drilling is generally adopted in this part of Kent, the event juſtifying the practice. Drilling has been in vogue here near 40 years, and I believe the work no where better done, or better implements for the purpoſe. I wiſh you could perſuade Mr. Wimpey to favour me with an account of his five-furrow drill, in the 4th article.* There is no farmer in this country of 40l. per annum without a drill, and I have no doubt would procure better were they to be had on eaſy terms.

Being ſurrounded with water, and much infeſted with rats, I have tried various recipes without effect, viz. the Miller's infallible powder, Dutch paſte, Northy's ſpecifick, arſenick, ſublimate, and opium, all which have been eaten without deſtroying, I verily believe, five rats; we never found more than two. Perhaps the ſociety may be in poſſeſſion of a ſpecifick for this kind of vermin; ſurely it is a deſideratum in rural œconomy, and well worth enquiring after. I will thank you for the beſt recipe you have.†

Your moſt obedient humble ſervant,

JAMES WYBORN.

Hull, near Deal, Feb. 17*th*, 1792.

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* This drill is now at the ſociety's rooms, and is partly deſcribed in this volume.——† A premium is offered for the diſcovery.

ARTICLE XXI.

On the Smut in Wheat continued, by the ſame.

SIR,

NIL Deſperandum, is a motto that every man who wiſhes to inveſtigate abſtruſe ſubjects, ought always to have before him. Is not ſmut ball a ſubſtance in its nature generated through a wheat grain and its plant? Strange and abſurd as this hypotheſis may appear to us at firſt ſight, yet if we reflect on the various phenomena in the animal and vegetable ſyſtem, that daily preſent themſelves to us, we ſhall [illegible] think it not altogether unworthy of our attention and enquiry. The oſtrich, we are told, commits her eggs to warm ſand to produce its progeny; the cuckow, we know, in our own country, depends on the incubation of the hedge-ſparrow to produce, and afterwards to its foſtering care to nouriſh its young, till it is able to procure ſuſtenance for itſelf. We ſee the miſletoe produced and nouriſhed by various [illegible] the like of many ſpecies of moſs; cabbages [illegible] producing colliflowers, and colliflower ſeed cabbages, and mules partaking of both. We know divers inſects are produced on and within vegetables; but to come nearer to the queſtion: as well as ſmut ball, cockel grows in the ears that nature ſeemed to have formed for wheat, and (as in ſmut) I have ſeen ears which contained part cockel and part wheat; may not this poſſibly proceed from an imperfect generation? I never knew, or heard it aſſerted, that ear cockel (as it is called) was ever found amongſt wheat, where it was not obſerved in the ſeed before ſowing; that it grew ſpontaneouſly, or was cauſed by an untoward ſeaſon. It is a ſmall, nearly black berry, about the ſize of a ſmut ball, the flour is greyiſh; that part of the ear which contains them, I am informed, does not bloſſom, as I have obſerved by ſmut; and I do not recollect ever to have ſeen it grow amongſt any wheat but the old Kentiſh brown, of which there is now very little ſown in this part of Kent. I ſhall leave the field open for other opinions, by only ſaying, it may poſſibly be produced in this manner, or be a diſeaſe, as I have obſerved in the laſt volume of Young's annals.

It is ſufficient for the farmer to know the fact, that ſmut is generally produced by ſmut; at leaſt that it *can* be ſo produced; but how that is effected, we muſt leave to Lewenhoc, and other nice obſervers of the works of nature;* for whether, as I have ſaid before, it is produced by generation, or is a diſeaſe, it is immaterial, if we know a remedy that will ſtop its progreſs, either by curing the latter, or rendering impotent the former. A ſolution of ſublimate, arſenick, or other cauſtick alkali, my experience tells me, will anſwer our expectations; that of arſenick is a ſafe, clean, and *cheap* remedy; a firſt conſideration to a practical farmer! But we are told in your 5th vol. p. 245, "that it is ſo dange-" rous and abſurd, that men of common ſenſe are "afraid and aſhamed of the practice." Are then mercury, antimony, opium, and bark, the baſis of of the Materia Medica, to give place to powder of poſt, becauſe in injudicious hands they have produced the worſt conſequences? and their preſcribers be accuſed of wanting common ſenſe? Surely not. Herculean diſeaſes require Herculean remedies; the ſolution of arſenick has not been uſed only on an acre or two of land by way of experiment, but on *hundreds* of acres, to the entire ſatisfaction of myſelf and other farmers that have uſed it; and they may reſt aſſured (provided the corn be ſown within 24 hours after immerſion) that no danger will ariſe to the ſeed, although it may have been many hours in the water, and no lime uſed; but as the weather at that ſeaſon is uncertain, it is beſt to wet it as you have occaſion; fifteen minutes is ſufficient for its being in the water, and it will be dry enough for ſowing in an hour or two after; if any ſuſpicion of ſmut in the ſeed, it may remain ſome hours in the water without injury. I uſe no lime, it drilling better without.

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* See the contrary opinions maintained by the writer alluded to in a following paper.

This is the practice of, Sir, your moſt obedient humble ſervant,

JAMES WYBORN.

Hull-Place, Feb. 22, 1792.

P. S. My gardener, a very ingenious Scot, has often aſſured me, that in the early culture of cucumbers in frames, on finding a female open and expanding herſelf before any male was preſent, he has had recourſe to a little dry duſt from the border, which has ſo tickled her fancy as to produce in a few days as fine a cucumber as the farina of the ſtouteſt male could have effected; if this be true, (and I have no reaſon to doubt his word) ſurely it militates againſt ſome received opinions. This experiment is eaſily tried by any who wiſh to be better ſatisfied. We read that the duſt which ariſes like ſmoke from that ſpecies of fungus called puff-ball, appears on a microſcopic obſervation to be the embryos of that ſpecies, or ſo many little puff-balls. I wiſh thoſe who have an opportunity would thus examine the powder of ſmut ball.

Article XXII.

Thoughts on the ſame Subject.

TO THE SECRETARY.

SIR,

A Gentleman put into my hands the five volumes publiſhed by the order of the Bath Society for the encouragement of Agriculture. I have peruſed them with much pleaſure and great attention, and think in general the ſubjects treated of are carried to great perfection. We have an old adage, *A word to the wiſe is ſufficient*; if by a few hints I can any ways aſſiſt the gentlemen concerned in that laudable inſtitution, it will give me much ſatisfaction.

The ſubject I have contemplated on moſt, is, *What are the cauſes which produce the Smut in Wheat?*

The following I ſuppoſe are the principal:

1*ſt*. Avoid ſowing infected ſeed, procuring it from a friend you can rely on.

2*dly*. After having properly watered your ſeed, (no brine required) *lime it plentifully*, for I think much depends on this proceſs, to keep the ſeed from injury whilſt it lies on the ſurface of the ground, or but ſlightly covered; for I imagine the *diſeaſe* then begins, and continues 'till the ſmut-balls are formed; beſides, the lime acts as a ſtimulator after it is effectually covered.

If the injury be owing, as ſome of your correſpondents have ſuppoſed, to the inclemency of the weather at the time of blooming; what ſhall we ſay, when we ſee two adjoining lands, for inſtance, in a common field, belonging to different occupiers, who uſed different ſeed, begin their blowing at the ſame time; one ſhall be almoſt free from ſmut, and the other very much injured? This cannot be owing to the atmoſphere, for they have both the ſame.*

Every grain, when committed to the earth has, or ſhould have, its embryo perfect; and having abſorbed ſome moiſture, a fermentation commences, and the fixed air in the corn begins its motion, and by a rapid circulation warms the germ and its concomitant parts; ſome part at that juncture receives a check, and a mortification enſues, but in ſo ſmall a way as not to affect the great progreſs of vegetation, 'till nature has almoſt finiſhed her work.

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* See Mr. Wimpey's opinion on this point, in his next letter.

To prevent this malady, having got good ſeed, limed after the uſual manner, ſow early before the ſevere froſt begins; for I imagine it perforates the grain, and wounds ſome part of it. Sometimes in a very wet morning the lime is waſhed from the ſeed, and this contributes to produce ſmut. At preſent this is chiefly ideal, not ſufficiently authenticated by experience. The pureſt ſeed, if ſown dry and late in the autumn, will moſt probably turn to ſmut, to the very great loſs of the farmer. We know good and ſmutty corns are produced in the ſame ear. Is it very improbable but nature has given to each grain a tube or conductor from its root? If ſo, it may account for my hypotheſis.

I have taken the liberty to trouble you with my thoughts on this very intereſting ſubject, ſuppoſing, under your patronage, it may undergo a farther inveſtigation.

I am, Gentlemen,
With great reſpect,
Your obedient ſervant,

Maidenhead, Berks. W. R.

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ARTICLE XXIII.

Further Remarks on the Cauſe of the Smut in Wheat; and on planting Potatoes.

In a Letter to the SECRETARY.

SIR,

IN a former letter on this ſubject, I mentioned my having then more experiments on foot, with a view to the further inveſtigation of the cauſe of the ſmut in wheat; I now do myſelf the honour of requeſting leave to ſubmit the reſult to the conſideration of your very reſpectable Society.

It is true, that, although thoſe experiments were numerous, they have afforded no new diſcovery; I mean nothing different from the reſult of thoſe I formerly related; yet I think they may be of great uſe, as they may ſerve to corroborate and confirm the opinion I maintained reſpecting the cauſe of an evil ſo extenſive and alarming.

To give a circumſtantial relation of each experiment would be both tedious and unimportant; ſuffice it then to ſay, they were made with ſound corn picked out of ſmutty ears, ſet at different times and on different ſoils, prepared by ſteeping in different liquors; ſome in ſimple water, and ſome without any preparation at all. The reſult was, that one ſmutty ear was not to be found in any one of the experiments.

It is true indeed the wheat of laſt year was in general pretty free from ſmut; but if the cauſe of the evil originate in the ſeed, and not in the ſeaſon, the produce of the above experiments would have been juſt as liable to the ſmut, being taken from ſmutty ears, as in any other ſeaſon whatever.

Some of the ſeed of thoſe experiments was ſteeped in a ſolution of ſalt, ſome in a lixivium of wood aſhes, ſome in a ſolution of ſugar, ſome in ſtrong ale, ſome in clear water, ſome were ſet dry as they came from the ear; but at harveſt there was no perceptible difference, either as to ſtrength of plants, or ſoundneſs and plumpneſs of grain. I could not perceive that any advantage had been gained by any of the infuſions made uſe of, excepting that the corn from the unwaſhed ſeed abounded much more with weeds, than that from the ſeed which had been ſteeped and waſhed; which was rather contrary to what I had hoped and expected, from a former experiment of ſteeping, which ſeemed to promiſe an increaſe of fertility and produce.

There is one experiment, however, I would beg leave to relate a little more particularly:

The firſt experiment I made on ſmutty wheat was four years ago, on ſome ſound corns I picked out of a ſmutty ear of white wheat, ſaid to be originally from Canada. The corn from this ſeed I have continued to plant ever ſince, to try if there would be any return of the original taint, or ſymptom of that diſorder. The produce ever ſince has been not only free from it, but the grain remarkably plump and fine. In the harveſt of 1790 the whole of it was nearly deſtroyed by birds. I did not ſave a tenth part of it, and that from the weakeſt and lateſt ripe ears; however, I ſaved all I could, and planted it in my garden the Auguſt following; and to prevent a like devaſtation from the birds, I had part of a ridge dug in the middle of a field of wheat reſerved for that purpoſe, and in February following tranſplanted it there in rows, at 9 inches diſtance, and 6 inches apart in the rows; when the plants were about a foot high, they were completely eat down by the hares, and I thought them deſtroyed irrecoverably; but they ſoon ſhot up again, and at harveſt produced as long and fine ears, and plump ſound good corn, as I ever ſaw. The produce was at the rate of 37½ buſhels to the acre, and the weight of the buſhel 72 pounds, 9 gallon meaſure. The ſoil a poor binding loamy ſand, which if undiſturbed ſoon grows moſſy. It had borne ſix drilled crops in ſucceſſion, four of them wheat, without any manure whatever.

From this and ſome other obſervations I have made on tranſplanted wheat, I am convinced no mode of practice would equal tranſplanting as to quantity of produce; but from the great labour and expence, and number of hands it would require, that mode of cultivation on a large ſcale is abſolutely impracticable, and therefore not to be thought of. But to return to our ſubject.

Some who favour the opinion that the cauſe of the ſmut is from the depravity of the ſeed, have obſerved, that "when two adjoining fields have
" begun their blooming at the ſame time, but be-
" longing to different owners, and therefore ſown
" with different ſeed, one ſhall be almoſt free from
" ſmut, and the other greatly infeſted with it; this
" cannot be owing to the atmoſphere, (ſay they,)
" for they have both the ſame; now what then can
" be ſaid to this by thoſe who ſuppoſe the ſmut is
" owing to the unfavourableneſs of the weather at
" the time of blooming?

I anſwer, the objection ſeems calculated to give countenance to their opinion, but it by no means enters far enough into the buſineſs to inveſtigate the truth; for though the fields are contiguous, and their atmoſphere equally ſo; correctly and truly ſpeaking, the latter may be no more the ſame than the former, probably in reſpect to quality far more different. When we ſpeak of the atmoſphere, we mean, not only the circumambient air, but every principle of whatever nature or kind that floats in it. Theſe are ſometimes of a very malignant nature, and extend far and near, but are frequently confined to a kind of ſtream or current, like water in a river, and affect thoſe objects only which ſtand in their way and obſtruct their paſſage. It is not very uncommon to ſee trees and plants blighted and blaſted on one ſide, while the other ſhews not the leaſt ſign or mark of being injured. Such partial ſufferings happen at times to almoſt every field, and every kind of plant it bears.

It hath many times fallen within my obſervation, that the eaſt and ſouth ſides of a field of wheat have been exceedingly ſmutty, when the north and weſt, and the other parts of the field, have been little affected by it. But further, we have frequently found both ſound and ſmutty ears growing from the ſame root; and what is ſtill more, ſound and ſmutty grains, at the ſame time in one and the ſame ear. To imitate our objectors, then, and attempt to obviate one difficulty by ſtarting another; will they permit me to aſk what they can ſay to this? If ſmutty ſeed infallibly produces a ſmutty crop, as they maintain, what produces the ſound ears which grow out of the ſame root with the ſmutty ears, and the ſound grains which are found in the ſame ear with the ſmut-balls?

This ſingle obſervation clearly refutes their whole argument. It is an eſtabliſhed maxim in phyſicks, "that the ſame *cauſes* infallibly produce the ſame "*effects*;" and were it not ſo, human knowledge of any future event would be an impoſſible thing; for this is the principle which directs actions to ends; without it, intention or deſign would have no object. To ſay then that both ſound and ſmutty grain proceed from the ſame root, which root is vitiated and depraved, yet is the efficient cauſe of both, is as palpable a contradiction as to aſſert, that good wholeſome blood, and a putrid, malignant, poiſonous ichor, may be taken from the ſame vein at one and the ſame moment,*

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* A friend of Mr. Wimpey's, on reading this remark, obſerves, that even this may be poſſible. The ſtream of the ſame moment may contain good and highly contaminated particles.

It is univerſally admitted, that the ſmut moſtly abounds in cold, wet, inclement ſeaſons. If the ſmut then, as theſe gentlemen think, proceed from corrupt or vitiated ſeed, we ſhould find moſt of it the year following any year in which it much abounded; for if it proceed from ſmutty ſeed as its ſole cauſe, as they maintain, certainly every ſucceeding crop would increaſe in ſmut, as the quantity of ſmutty ſeed ſown would in ſome degree at leaſt be in proportion to the quantity of ſmut in the crop of the year preceding; therefore, if this were the caſe, the ſmut would annually increaſe, till in a very few years we ſhould have none that would be free from ſmut; that is, it would be all ſmut, and we ſhould have no wheat at all; for ſmut-balls contain nothing but an effete ſtinking powder, totally deſtitute of every principle of life, and therefore never vegetate at all. But this is ſo far from being the caſe, that a very ſmutty year is often ſucceeded by one that has little if any ſmut. This generally happens as often as a damp, cold, inclement ſeaſon is ſucceeded by one that is warm, dry, and favourable to the growth and ripening of grain.

In ſhort; it is not eaſy to enumerate the arguments that might be adduced in ſupport and confirmation of the opinion here advanced; I ſhall therefore content myſelf with the recital of the two recent caſes following:

In the year 1790, a near neighbour of mine, an intelligent farmer, in a large way of buſineſs, procured a ſample of very fine, clean, ſound wheat, of which he purchaſed enough to ſow a large field. The reſt of his land he ſowed with wheat of his own growth. From the ſeed he had purchaſed he hoped to reap enough good corn to ſupply him with ſeed for his whole crop the following ſeaſon, but at harveſt how great was his diſappointment! The produce of [illegible] ſeed turned out very ſmttty, whereas the crop from the ſeed of his own growth had little if any in it.

Another farmer, who lived about a mile from me, being rather in low circumſtances, was induced to ſow, the ſame ſeaſon as above, ſome very ſmutty wheat he had by him; it not being convenient to purchaſe good clean ſeed; but very fortunately for him, his crop proved as clean and as good as any in the neighbourhood, having very little if any ſmut in it.—These caſes are far from being ſingular, for many ſuch have come to my knowledge.

Now if any advocate for the opinion that the ſmut proceeds from ſeminal corruption or depravity, will account for the poſſibility of theſe facts conſiſtently with his own principles, I will be one of the firſt to vote him a ſtatue to perpetuate his fame for inimitable ſkill in the ſolution of difficulties.

Of POTATOES.

I formerly had the honour of ſubmitting to the conſideration of your Society (vol. v. p. 230.) an account of an experiment to diſcover whether whole potatoes or cuttings are to be preferred in planting. —From that account, it clearly appeared, that the advantage lay greatly on the ſide of cuttings. But as, from long experience, I know concluſions drawn from ſingle experiments cannot be ſafely depended on, and the reſult of that experiment differing ſo widely from an account given by a very reſpectable correſpondent of the Society, whoſe accuracy is well known, and of whoſe probity and veracity I have the higheſt opinion; I reſolved to repeat my former experiment as exactly as poſſible, by way of eſtabliſhing a fact ſo intereſting to the public if found juſt, or of retracting an error if it ſhould appear to be one.

In the ſpring of 1791, I prepared about three acres of ground, and in April planted it with potatoes.

tatoes. A certain quantity of the largeſt and fineſt were ſelected, one half of which were planted whole, the other cut into pieces of a moderate ſize. An exact account of each was kept at taking up, when it appeared that the acreable produce was much the ſame as in the former experiment; but as the cut potatoes planted nearly four times the ground that the whole ſets did, the advantage lay in the ſame proportion on the ſide of planting with cut potatoes; therefore I think there cannot be the leaſt doubt that the preference is to be given to cuttings, as the ſucceſs of the two experiments ſo nearly coincides.

I have been uſed for ſome years to furniſh my neighbours with potatoes for planting. The laſt ſeaſon one of them deſired I would let him have them all ſmall. He ſaid he had planted ſmall ones ſeveral years, that he found them equally productive with the largeſt, and ſaved much trouble in cutting. Others preferred the largeſt, who carried their œconomy much further; they it ſeems uſed to pare them, eat the fleſhy part, and plant the rinds only. Upon enquiry, I found it was not an unuſual practice among the cottagers, and I have been credibly informed they get as large crops and as good potatoes in that method of planting as in any other whatever. If this be a fact, it ſeems to appear that the fleſhy part of the bulb is of no uſe in ſupplying nouriſhment to the young fruit after the fibrous roots have put forth and laid hold of the ground. Perhaps an experiment of this ſort may be thought worth making.

I am, Sir, your moſt obedient ſervant,

JOSEPH WIMPEY.

Bratton-Clovelly near Okehampton,
Devon, April 1792.

ARTICLE XXIV.

On the beſt Method of providing for the POOR.

WITH PRELIMINARY AND SUBSEQUENT CONSIDERATIONS, BY THE SECRETARY.

THE materials which compoſe the former volumes of this Society, are for the moſt part a recital of experiments and practical opinions in the great department of Agriculture. To advance the knowledge of that ſcience was a primary object in the inſtitution of the Society, and it is confeſſedly an object, in every enlightened country, paramount to every other conſideration. The favourable reception theſe volumes have met with among the landed gentlemen, and liberal-minded farmers, may be conſidered as a proof that the proceedings of the Society have not been unſucceſsfully devoted to their main end.

The papers contained in the preſent volume, though a continuation of former exertions in the publick cauſe, will be found to embrace objects of improvement beyond the common province of the farmer. Among them that of planting, the embelliſhment of eſtates, and the proviſion of a national ſtore of oak timber, are conſidered as particularly worthy of the publick attention; the attention eſpecially of opulent land-owners, who poſſeſs from that opulence, and from their leiſure, powers of exertion peculiar to themſelves. In this claſs of the community there are obviouſly other powers of doing good, which, happily exerted, muſt redound to their laſting honour, and no leſs to the happineſs and ſolid glory of their country. Nor will it be a circumſtance of ſmall encouragement to an exertion of their natural influence, when an object ſhall be held out, in the accompliſhment of which the manufacturer and the ſedulous tradeſman are found qualified as able coadjutors. To the latter deſcription of citizens it will alſo afford much encouragement, to be ſupported in their efforts by the weight and influence of the former. To both, it muſt be a ſtrong inducement to a cordiality of exertion, where the end to be accompliſhed by their joint endeavours is dictated at once by political wiſdom, and the benevolent laws of the Supreme Being. The object which, by the encouragement of the proper committee, I am induced to conſider in this paper, is,

THE BEST METHOD OF PROVIDING FOR THE POOR.

This is an object which needs no apology in a work like the preſent; it is a moſt important branch of political œconomy, cloſely connected with the general good, and, in the preſent ſtate of the country, of immenſe magnitude.

A learned and truly reſpectable Phyſician, a Vice-Preſident of this Society, gave, in a former volume, his thoughts on the moſt ſimple and obvious means of preſerving the health of labouring perſons, employed in agriculture. That paper has been received with the praiſe due to its merit, and will be regarded as a valuable directory to the benevolent farmer and maſter, ſtudious of the health of his ſervant. It is with due reſpect to equal benevolence,

lence, and due deference to ſuperior abilities, that a ſervant of the Society preſumes to follow him in reflections for the comfort and happineſs, not only of the ſame claſs, but of every claſs of labouring people.

A patriotic ſenator* was employed for a ſeries of years, in framing a bill for the regulation of the *Poor Laws*, and thereby to leſſen the general burden of the country, by ſimplifying the parochial management, guarding againſt the ſuffering of the worthy, and the impoſitions of the idle and licentious poor. What, if any, will be the reſult of his labours in parliament for theſe ends, is yet to be proved. Every friend to the general happineſs of mankind, muſt wiſh that ſuch a bill may be adopted at laſt, as may tend to the aid of virtuous indigence, and the moſt effectual correction of publick abuſe. While this great and difficult ſubject ſhall be in agitation, it is much to be deſired, that gentlemen of leiſure and talents in different parts of the country, would give that attention to it which the liberal views of ſo active an advocate have invited, and which its importance ſo loudly calls for.

In every civilized country its interior political œconomy, which involves the moral good and the ſocial comfort of a large proportion of inconſiderate and impotent perſons, is a ſtudy highly worthy of the philoſopher and the Chriſtian.

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* Mr. Gilbert.

In this country, poſſeſſing as it does, in an eminent manner, various local advantages, the lights of knowledge, the freedom of religion, and comparatively happy in the freedom of its government; ſuch men are peculiarly called on to exert their talents for the prevention of miſery, and the promotion of general order and happineſs in the ſubordinate claſſes of Society. The perfect attainment of theſe ends, by national laws and regulations, is not to be expected. Human laws, the ſchemes of human imperfection, and which are neceſſarily in ſome degree theoretical, muſt ever be inadequate to the production of perfect virtue, and conſequent felicity. It is ſufficient if they be the beſt that human prudence could deviſe, to anſwer the beſt ends. Such laws will at leaſt ſerve as general ſecurities of order, union, and proſperity. But after all which the wiſeſt policy can enact, a large field will remain open for the more private offices of the active and benevolent citizen; and whatever can be privately done, by plans of local œconomy, moving on the provident principles of morality and virtue, will be ſo much in aid of the wiſeſt laws of the ſtáte; or rather it will ſupply the natural and neceſſary defect of them. What can be more worthy of a wiſe and good man, than to be employed in effecting a good, which a *government* cannot accompliſh, and that by exercſing, moſt to his own rational delight, the benevolence of his own mind?

Of the Vagrant Poor,—thoſe who under various pretences wander about the country without any viſible means of getting a maintenance, and who furniſh but too common a ſuſpicion of their being worſe than ſturdy beggars,—we ſhall ſay but little. As vagrants, the laws now in force provide for their being treated as they too generally deſerve; and if ſuch perſons were more frequently taken into cuſtody, and compelled to give an account of themſelves, it would be equally good in its conſequences to them and to the community. In this reſpect the activity of magiſtrates, in puniſhing the idle and profligate on the one hand, while on the other they exerciſe their authority in their diſtricts, to prevent parochial oppreſſions, and neglects of duty towards the diſtreſſed, will prevent much irregular ſtrolling, and correct the motives to it. This very important part of a magiſtrate's duty, though in itſelf an unpleaſant and invidious one, cannot be too much commended, wherever diſcharged with a due regard to juſtice and humanity. The character of ſuch a vigilant and worthy magiſtrate will operate to the terror of idle wanderers, while the caſually diſtreſſed poor traveller will be ſecured from famine, and the bitter temptation to ſteal.

But the claſſes of poor for whoſe benefit this article is principally intended, are, the reſident labourers in huſbandry, manufactures, and mechanics. Such may be ſaid to form the bulk, and the valuable bulk too, of the people in this country; to render their poverty the leaſt irkſome to themſelves and to the publick, and as much as poſſible to *prevent* poverty, will be allowed in every point of view to be a work of exalted charity and univerſal benefit. It wiſely anticipates natural evil, by the timely application of moral principles. This we may fairly hope is practicable in moſt pariſhes, becauſe it has been found eaſily practicable in various ſituations.

The eſtabliſhment of Provident Societies, for a proviſion in health againſt the day of ſickneſs, has been tried, and wherever it has been tried, the effect has been uniformly good. The mode of this proviſion has been in its outline generally the ſame,

i. e. by inducing the labouring claſſes to appropriate ſome ſmall part of their earnings to a fund, from which they may draw ſuccour in the hour of need. This plan has indeed ſometimes originated with the moſt ſenſible of the poor themſelves, and has been carried into effect without much patronage from the wealthy. But where the latter have been active in aiding, by their example and protection, this commendable diſpoſition, it has ſucceeded in a proportionable degree. And ſo conſiderable in ſome inſtances has that degree been, as to make it a matter of ſurpriſe that ſuch œconomy has not been univerſal! The reaſon, indeed, of this defect of exertion is to be found, where every other moral defect has its origin; in the natural propenſity of the human mind to do thoſe things which ought not to be done, and to omit thoſe which ſhould be performed.

To dwell on a moral defect is a far leſs pleaſing taſk, than to urge the wiſdom and happineſs of doing well. This, therefore, we will endeavour to do, as the moſt likely means of engaging that attention, which may be favourable to the end in view. Now with every common deduction from the *goodneſs* of human nature, it ſeems obvious that the mind of man is prone to *commend*, at leaſt, the amiableneſs of virtue, and ſincerely to approve thoſe deeds of ſocial kindneſs which appear moſt conſpicuous in any character. Never, perhaps, was there an inſtitution, well-planned by human foreſight for alleviating human miſery, that did not ſooner or later gain the applauſe of the publick. The virtuous active citizen, wherever he has been found devoting his labours and his wealth to the protection of the indigent, the maimed, or the ſick, has been generally beloved while living, and his memory after death has been honoured and revered. The hero may be remembered, from the ſplendor of his devaſtations, with a mixture of admiration and diſguſt: the ſage will be renowned for the acuteneſs of his judgment; but it is the character formed on the principles of "the Man of "Roſs," that excites the tribute of univerſal eſteem. Such a tribute produces a reflected pleaſure on the mind that beſtows it; while the benevolent feelings of that man who deſerves it, are his own higheſt reward. They preſerve in his boſom a perpetual glow of delight, with which mere amuſement or ſenſuality can never be connected.

Various have been the outlines of plans, ſubmitted to the publick examination, with a view of bringing the ſubject before parliament, ſo as to obtain a *national* reform, by authority. But improvements by inſtitutions of authority, have long been waited for in vain. Some have held forth the neceſſity of large buildings under the names of work-houſes, houſes of induſtry, &c. to be eſtabliſhed in certain diſtricts through the nation, for carrying on different branches of manufacture, by means of the indigent, who ſhould want relief; thereby ſuppoſing that ſuch poor would be more certainly employed, more regularly ſuperintended, better provided for, and at a cheaper rate.

Others have reprobated that ſyſtem *in toto*, and maintained that while ſuch houſes would be attended with an enormous expence of building, they would do nothing towards leſſening the general burden; but that the poor in them, committed as to ſo many jails, would be rendered unhappy; their morals, from a crowded way of life, would become more corrupt; their labour would be leſs, and their work worſe done; conſequently, that manufactures would be injured: that the maintenance of the poor would coſt more, and that the peaſantry would be enervated by ſuch early confinement and reſtraint.

Under ſuch contradictory opinions, the ſubject has received but little elucidation; and the uncertainty of a new national regulation continues as great as ever; while, notwithſtanding the flouriſhing ſtate of moſt manufactures, the poors-rates are making a conſtant advance. The laſt circumſtance muſt prove, either that population has been rapidly increaſing, or that the ſyſtem of managing the poor is daily becoming worſe. The former of theſe may be true; the latter cannot be the caſe, without a national degeneracy in the morals and habits of the poor. To obviate ſuch a probable evil, as well as to lighten the general burden, it has been a favourite theory of ſeveral intelligent writers, that the poor may be made to maintain themſelves. Under the preſſure of inſufficient millions of expenditure, this ſhould ſeem a paradox; and yet ſo plauſible, and indeed rational, have been ſome calculations, that the poſſibility of almoſt realizing ſuch a ſcheme, is not void of hope.

Among the moſt ingenious of thoſe ſchemes may be conſidered that of Mr. Pew, late of Wellingborough, but now of Shafteſbury. His treatiſe, which is intitled *Twenty Minutes Obſervations on a better Mode of providing for the Poor*, ſeems to have been long undeſervedly out of print, and not to have been known in proportion to its merit. As containing facts, reſpecting an aſſociation in one place, attended with remarkable ſucceſs, and reaſoning very fairly from thoſe ſo general advantages of the like nature; it has been thought adviſeable by the Committee of this Society's papers to ſolicit the author's conſent to its being republiſhed at the Society's expence. And it was with particular pleaſure that the Committee received his conſent for that purpoſe in the moſt obliging terms. In juſtice to the maſterly outline which this tract exhibits, and to the ſtyle and manner of the author, the whole is given without alteration.

Twenty Minutes Obſervations on a better Mode of providing for the Poor; in which it is rendered probable that they may be effectually relieved, in a manner more agreeable to the general Feelings of Mankind, at the ſame time that Two Millions ſterling, or more, may be annually ſaved to the nation.

By RICHARD PEW,
Fellow of the Royal Society of Medicine, Edimburgh.

PREFACE.

Regulations which tend to increaſe the happineſs of individuals, at the ſame time that they diminiſh the general burthens of the community, will command the attention of a diſcerning Legiſlature. The author flatters himſelf that both theſe ends may be in a great meaſure accompliſhed, by the plan he is about to propoſe; and he therefore makes no apology for communicating his ſentiments to the publick.

Twenty

Twenty Minutes Obſervations &c.

THE rapid and enormous increaſe of the poor's rate in this kingdom, during the laſt few years, has for ſome time created in the landed intereſt the moſt general and juſt apprehenſions; many plans have been ſuggeſted, and many ſchemes deviſed, to remedy or diminiſh the grievance, but hitherto with little or no effect; nor ought it perhaps to be expected that the burthen ſhould ever be totally removed, although it may be very much alleviated. At any rate, it is an object of the moſt ſerious concern, that its increaſe ſhould, if poſſible, be prevented, and its preſſure, as far as can be, equalized. To this end there is reaſon to hope that the bills lately framed by Mr. Gilbert may a good deal contribute; but is there not a poſſibility of doing ſomething more? Thoſe bills are rather calculated to correct the evil; may we not in ſome meaſure, by anticipation, prevent it?—In this perſuaſion, I ſhall venture to offer a few obſervations.—I believe it may be aſſerted with juſtice, that moſt of the diſtreſſes of the poor in this country are more artificial than real diſtreſſes; they do not depend ſo much on any difficulty in procuring the neceſſaries, or even the conveniencies of life, as upon a total want of œconomy amongſt the poor, in the management of what they earn; it being too much the cuſtom with them *(ultimately certain of relief from the pariſh)* to ſquander immediately all they get, be it little or much; ſo that our manufacturers and labourers, with very few exceptions, are equally poor at the week's end, whether they have earned in that week a guinea or five ſhillings; the ſurplus in ſummer, or a time of plenty, inſtead of being laid up againſt winter, or a time of ſcarcity, is ſquandered away in at beſt what is unneceſſary, and often in acquiring habits of idleneſs, extravagance, and intemperance, not eaſily to be relinquiſhed. It is the buſineſs of a wiſe legiſlature to correct, if poſſible, this extravagant tendency of the people, and, where it cannot hope for a natural and poſitive habit of œconomy, to ſubſtitute, if practicable, a negative and artificial one; that ſome kind of equilibrium and uniformity may take place between the income and the expenditure of the poor throughout the year; for as matters now ſtand, (from this total want of œconomy) the wants of the labourer are greater in winter, when he has fewer means of ſupplying them, than they are in the ſummer, when he can earn much more; ſo likewiſe in the ſingle ſtate, and in the vigour of youth, a man's *wants are inconſiderable* to what they are in the married ſtate; and in the winter of age, when from the diminution of his ſtrength, or the increaſe of his family, he is leſs able to ſupply them. Yet notwithſtanding theſe facts are continually paſſing before our eyes, we find that mankind have not of themſelves ſufficient reſolution to be œconomical, or to lay up any thing in health and proſperity, againſt the attacks of poverty and diſeaſe.

It has been my fortune to be placed in a ſituation, which obliges me often to viſit the dreary manſions of the wretched, when the jaundiced eye of diſeaſe gives additional horror to the meagre countenance of poverty. With a mixture of ſorrow, indignation, and pity, have I often ſeen a young man, capable of earning fourteen ſhillings a week, with a wife in perfect health, and *only one child*, reduced by a ſingle week's illneſs to the neceſſity of ſeeking relief from the pariſh! whilſt the furniture of his houſe, and the coverings of what was called his bed, were ſufficient, from their filth and naſtineſs alone, to occaſion diſeaſe in the moſt robuſt conſtitution. Could this extreme poverty proceed from any other cauſe than the moſt ſhameful miſmanagement?*

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* As a proof that it could not, I have now within my eye a poor honeſt fellow, who earns no more than ſix ſhillings per week, has five children under nine years of age, and his wife big with the ſixth, who held out, notwithſtanding, under a ſtate of total inactivity, for full four weeks, without applying to a pariſh, and without running in debt.

and is it not the duty of every government to oblige ſuch perſons to be œconomical, whether they will of themſelves or not, and to compel them, if poſſible, to lay up ſomething in health and youth againſt the attacks of a numerous family, ſickneſs, or age? It ſhall be my buſineſs to examine the poſſibility of putting an equitable ſcheme for this purpoſe into execution—let others determine how far it be compatable with the ſpirit of the Britiſh conſtitution.

In matters purely ſpeculative, no certain concluſion can be drawn *a priori* of their ſucceſs, when reduced to practice; we are obliged, therefore, to reaſon from the beſt analogies we can find, and to form our conjectures of the probability of their ſucceeding, by a compariſon with other plans, which experience has proved to be ſucceſsful. It is known to every body, that there are in this kingdom many aſſociations under the title of clubs, or friendly ſocieties, the object of which is to ſecure to the members of them, when incapable of labour, a certain ſum weekly, during ſuch interruption; of theſe I ſhall take for my example one inſtituted in this town* about forty years ago, upon the ſame principle, I believe, as moſt other aſſociations of this nature throughout the kingdon: every member pays into the hands of the Treaſurer one ſhilling every four weeks, which muſt be depoſited for one year compleat, before he becomes intitled to any relief from the ſociety; after that period, when rendered incapable of labour, he receives ſix ſhillings per week for the ſpace of ſix months; but if his incapability continues longer than that time, his pay is reduced to three ſhillings per week, which he receives until he gets well, or otherwiſe as long as he lives. The ſame proviſion is made for thoſe perſons who are rendered incapable of labour by age; for the firſt ſix months they receive 6s. per week, afterwards 3s. It alſo provides for burying the dead in a decent manner, and allows for each funeral three pounds. —This ſlender monthly contribution has been found ſo perfectly adequate to the purpoſes intended by it, that it has not only proved ſufficient to defray every expence, agreeable to the conditions held out, but has alſo enabled the ſociety, without riſk, to return a guinea to each member every two or three years (the number 48) retaining many pounds as Bank ſtock.

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* Wellingborough.

The perſon who ties my hair has been in this aſſociation for the laſt ſeven years; he has	*£.*	*s.*	*d.*
paid annually thirteen ſhillings, - -	4	11	0
Without having received any thing on account of ſickneſs, he has withdrawn at three ſeveral times one guinea, -	3	3	0
Balance paid	1	8	0

So that in fact 1l. 8s. is all that he has diſburſed in the ſpace of ſeven years, or 4s. per annum; a trifling ſum indeed, when compared with the advantages he might, if neceſſary, have derived from the inſtitution; but after all there remains in ſtock 36l. 11s. one forty-eighth part of which, or 15s. 2¾d. may be conſidered as his property, ſo that he has, in reality, in the courſe of ſeven years, *ſunk* no more than 12s. 9¼d. or 1s. 10d. per annum.*

That the income of the fund may ſuffer no diminution or interruption, every diſabled member continues to pay his monthly contribution as at other times, although he is upon the ſick liſt.

Now if ſo ſmall a contribution as one ſhilling in a month, or one twenty-fourth part of a common labourer's wages, be ſufficient, for *forty years together*, permanently to maintain a fund *more than adequate* to the purpoſe of affording to each member a comfortable ſubſiſtence when afflicted with ſickneſs, or exhauſted by age, might not a fund be drawn from the people at large upon the ſame principle (almoſt without their feeling it when in health and proſperity) ſufficient, or nearly ſufficient, to ſupport them in time of ſickneſs or in old age? In ſhort, may not every pariſh be *induced, or compelled,* to form themſelves into one or more friendly aſſociations, to which each individual above a certain age (ſuppoſe males 18, females 17)* ſhould be obliged to contribute a ſmall proportion of their ſuppoſed income, for the purpoſe of ſupporting them when unable to get their own livelihood?

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* Not above one-ſeventh part of the ſum originally paid, three-pence per week.

Let us inquire what would be the probable effects when applied to a particular town; I ſhall as before take that of Wellingborough.

It appears by an actual and exact enumeration, made under my direction, that the number of inhabitants reſiding in Wellingborough amounts in the whole to 2857; that out of theſe 847 males, and 1100 females, are above the age ſpecified; the ſum therefore paid by theſe perſons would be 847 ſhillings, and 1100 four-pences, every four weeks, amounting in the whole to 60l. 13s. 8d. or 788l. 17s. 8d. per annum.

The expence of the poor in Wellingborough, upon the average of three years laſt paſt, appears to have been 1191l. 4s. 11½d. from which deduct 788l. 17s. 8d. there remains 402l. 7s. 3½d. or very little more than one-third of the preſent expences of the pariſh. Let this be applied to the whole kingdom, taking the expence of the poor to be, as in 1773, three millions,* the ſaving to the nation will amount to the ſum of 1,984,885l. ſterling, a ſum well worthy the attention of the legiſlature; and this might be raiſed in a manner ſo eaſy and gentle, and ſo perfectly congenial to the wiſhes of the people, as ſcarcely to be felt, much leſs complained of, by any individual, eſpecially in manufacturing towns, where the poor are always the moſt numerous, and always the moſt wretched; ſince the ſum here ſpecified would ſeldom amount to one 48th part of the artificer's wages; yet the return, in the time of his neceſſity, would be much greater than it would be poſſible for the pariſh to afford him, however well diſpoſed they might be, and however great his diſtreſs.

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* About theſe ages, reſpectively, a ſpirit of independance uſually becomes manifeſt; it is this ſpirit I wiſh to catch, and to preſerve it unſubdued through life.

N. B. The computation here made is extremely moderate, ſince it allows nothing for the number of contributors prohibited from receiving,† the increaſed frugality of the poor, which may reaſonably be expected, the prevention of impoſition on pariſhes, (to an aſtoniſhing amount) by the clamorous and idle; the expence of removing paupers, the litigations concerning ſettlements, the number of payable males now abſent in the army and navy,* or the ſurplus which conſtantly takes place in all private inſtitutions of this nature; all which circumſtances taken together would certainly amount to a ſum not far ſhort of the 1,015,115l. unprovided for; nay, perhaps this inſtitution may hereafter be brought, by proper management, to afford a conſiderable ſurplus for the uſe of the ſtate; and thus the lower orders of the community, inſtead of being a burthen, would become, in every ſenſe of the word, beneficial to the nation; whereas the poor laws now in being, however benevolent in their original intention, do certainly operate as a ſevere *tax* upon *honeſt induſtry*, and as *a bounty upon extravagance.*

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* I ſtate this on the authority of Lord Kaims. Mr. Gilbert, who has been moſt laudably attentive to this ſubject, eſtimates the total expence at about two millions and a half.

† About one-fifth, which, it is ſuppoſed, will be nearly equal to the ſum neceſſary for the relief of large families, of widows, and of orphans.

" In Doctor Davenant's time (ſays Lord Kaims)
" the poor-rates were about 700,000l. annually; in
" the year 1764 they amounted to 2,200,000l. in
" the year 1773 they amounted to 3,000,000l.
" equal to ſix ſhillings in the pound land-tax."†

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* This was written in the year 1783, during the American war.

† Sketches of the Hiſtory of Man. Sketch 10.

Now if they have increaſed in an equal progreſſion ſince the year 1773, which there is too much reaſon to apprehend; they muſt (ſuppoſing this calculation to be juſt) have amounted in the year 1782 to 3,800,000l. ſterling; and the ſaving by the plan here propoſed will be increaſed in proportion, that is, to the enormous ſum of 2,500,000l. and this, even admitting the whole ſum now raiſed for the poor to be abſolutely neceſſary, and that the deficiency of the ſums raiſed by theſe contributions muſt be made up, how aſtoniſhingly great then will be the advantages to this nation, ſhould the funds alone, as they probably will, prove adequate to the ends propoſed by them!

Out of this fund every man, who is really incapable of labour, ſhall have a right to demand ſix* ſhillings per week, for the firſt ſix months, ſhould his illneſs laſt ſo long, and three ſhillings per week after that period, until he again becomes capable of labour; every woman ſhould have a right to demand two ſhillings per week for the firſt ſix months, and afterwards one ſhilling and ſix-pence per week, until ſhe is again able to work. I would alſo wiſh

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* I am inclined to believe that theſe proportions are not the beſt which may be adopted; but they are ſuch as the people have choſen for themſelves, and perhaps it might not be ſafe to alter them, at leaſt for the preſent.

to extend the advantages of this inſtitution, as a matter of right, to thoſe induſtrious poor perſons who are oppreſſed by large families, to the fatherleſs, the widow, and the orphan.*

For I find upon enquiry amongſt ſome of the moſt induſtrious of the poor, that it is almoſt impoſſible for a man to maintain a wife and three children, under nine years of age, upon ſix ſhillings per week, the wife's time being ſo much taken up in the neceſſary duties of her family, that ſhe can, under ſuch circumſtances, earn nothing; with two children under that age they acknowledge they can do tolerably well, and after they are nine years of age they can, if in health, nearly earn their own maintenance; every common labourer or manufacturer then, earning no more than ſix ſhillings per week, having three children under nine years of age, ſhall receive from the fund one ſhilling and ſix-pence per week until the eldeſt of thoſe children ſhall attain the age of nine years, or until one of them ſhall happen to die; and if any one or more of his children ſhall happen to be idiotic, inſane, or any ways ſo far diſabled either in body or mind, as to be utterly incapable of labour, each of them ſhall be conſidered as if ſtill under the age of nine years, and paid for accordingly. If a mother ſhould be left a widow with three children, under ſeven years of age, ſhe ſhall receive from the fund five ſhillings, if with two children three ſhillings, and if with one child one ſhilling and ſix-pence per week; if with more than three under that age, one ſhilling per week for each above that number, it being conſidered that all her time is taken up by three, and allowance made for it, but that ſhe is capable of looking after and taking care of a greater number, which however will very rarely happen.

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* For there is no reaſon why the terrors of poverty ſhould damp the inſtinctive parental joy, which ever accompanies the birth of a helpleſs innocent; why hunger ſhould aggravate the affliction of the widow; or why contempt and indigence ſhould neceſſarily embitter the irreparable loſs of affectionate parents: no, let us mitigate theſe unavoidable calamities, as far as lies in our power, by a frugal, an unhumiliating, and a determinate proviſion.

Orphans will be attended with ſomewhat more difficulty; the ſame proportions, however, ſhould be allotted from the fund for their maintenance, and ſome receptacle provided for them, where they may be taught to get their own living by the age of nine years; and widows, without children, under the age of 65, may, when in health, be conſidered as able to get their own ſubſiſtence.

Providing thus early againſt the poſſibility of neceſſary poverty, will be attended with the moſt happy effects, (for the poſitive advantages of this plan, however great, I conſider as ſcarcely equal to the negative ones) cheriſh that ſpirit of independency which is natural to the human mind, and in a ſhort time there will be found ſcarcely a really poor perſon in his Majeſty's dominions.*

It is with the poor man as it is with the tradeſman; the latter, as long as the balance at the year's end appears in his favour, and he adds ſomething annually to his capital ſtock, continues unremittingly to exert himſelf to the utmoſt of his abilites; but if, notwithſtanding his exertions, the balance of trade goes againſt him, and he finds his capital annually decreaſing, he begins at firſt to look into his accounts with reluctance, then neglects them altogether, and at length ſeeks relief in continual diſſipation.

So it is with the poor man; as long as he continues in perfect health, his earnings are generally ſufficient to procure him a comfortable ſubſiſtence; and if he is in debt to no one on Saturday night, he lays himſelf down contented. Let us ſuppoſe him now afflicted with a few days illneſs, that his credit is good, and he runs a little in debt; as ſoon as he recovers, he makes ſome efforts to pay it, but before he can accompliſh this, a ſecond illneſs overtakes himſelf, his wife, or his family, his debt of neceſſity increaſes, and at length arrives to ſuch a height, that he ſees it is impoſſible, by any exertions he can make, to recover himſelf; he feels hurt at the idea, his ſpirit is broken, and if no one from charity, or good policy, ſteps in to relieve him from his preſent dilemma, his deſire of independency is loſt FOR EVER; he applies to the overſeers for relief, and having once ſurmounted the pride natural to man, and been beholden (as they call it) to the pariſh, he is determined to get as much from it as he can; and thus, by an aggregation of ſuch caſes, the poor's rate is extended beyond all bounds. Such is the progreſs of the human mind, in the lower orders of ſociety, as I have too frequently had occaſion to obſerve.

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* The truth of this idea may be inferred from hence, that upon the moſt ſtrict enquiry I do not find more than one or two inſtances where any member of the aſſociation became chargeable to the pariſh; and theſe were under the preſſure of very large families, labouring under general ſickneſs, both which circumſtances would by this ſcheme be provided againſt.

Let us now turn our eyes to the ſcheme here propoſed, the eaſy practicability of which may be inferred from the general tendency of the people, both male and female, to run into ſuch aſſociations, under many difficulties, in every part of the kingdom, and its probable effects we have traced at ſome length before. It is true theſe aſſociations are, at preſent, chiefly compoſed of the more induſtrious part of the people, the lower claſs of tradeſmen; but we have made ample allowance, as I think, for the moſt conſiderable difficulties which can poſſibly ariſe, even amongſt the moſt neceſſitous part of the community. Could ſuch a ſcheme be carried into execution, many advantages would ariſe to the kingdom, independent of the increaſe of population, the relief it would afford to the landed intereſt, and ſtability it would give to public credit. By it the youthful, the vigorous, and the active, would inſenſibly become the ſupporters of the aged, the infirm, and the diſeaſed; the ſingle man, finding that he muſt contribute to the ſupport of the married man's children, would find it his intereſt early to obey the dictates of nature, and marry likewiſe, from which he would no longer be deterred, by the fear that himſelf and his offspring might become beggars.

Equally and enviably ſecured againſt the inconveniencies of poverty or riches, ſupporting and ſupported in turn by his fellow pariſhioners, the peaſant would paſs his days, the father of a numerous and vigorous offspring, in eaſe, tranquillity, and peace.

As all would be intereſted in the ſtability of the fund, each individual would become the overſeer of his neighbour; and as all would be provided for upon an equal footing, no diſcontent could ariſe on account of partiality; whilſt every one being ſecure of a comfortable and *determinate* ſubſiſtence, there could be no temptations to vice from neceſſity, and it is to be hoped fewer than at preſent from example.

The indolent man, not contributing his quota, would be equally obnoxious to the ſquire and to the peaſant; and as from his deficiency he would be immediately detected, ſo his idleneſs ſhould inevitably meet its proper antidotes, confinement and labour.

By proper certificates from one aſſociation to another, the detrimental, expenſive, and often inhuman removal of paupers, generally under a ſtate of diſeaſe, and frequently in the agonies of death! would be rendered unneceſſary; the amiable longings of thoſe individuals (who have gained ſettlements at a diſtance) to paſs the evening of their days in their native place, with their earlieſt friends, relations, and acquaintance, might be ſafely gratified; the litigations between pariſhes concerning the ſettlements of paupers would be heard of no more;

the petty ſhufflings and underhand tricks to evade or diminiſh the poor-rates, ſo common at preſent, would be annihilated, and every human being, without fear or moleſtation, would be enabled to ſeek his ſubſiſtence wherever his genius, his inclination, or his intereſt, might lead him; but, above all, the ſum of human happineſs would be conſiderably augmented, by the comfort which every man of moderate deſires and independent principles muſt feel, when he recollects, that whatever accident can befall him, to deprive him of the power of getting his ſubſiſtence, he is certain of a comfortable maintenance, without any diſgrace to himſelf, or any obligation to others. "In the days of my proſperity (ſays he to the Treaſurer of the fund) I depoſited a ſum of money in your hands to ſupport me when I ſhould fall under the preſſure of adverſity; that period is now arrived, I demand therefore on your part the fulfilment of the contract; pay me the ſum I ſtipulated to receive."

Such are the advantages which ſeem naturally to ariſe from the plan I have ventured to propoſe; but perhaps difficulties may occur in the execution, which I, in my zeal, may have overlooked, or which cannot at preſent be foreſeen; and which may render the ſcheme in ſome meaſure abortive. Theſe difficulties, ſo far as they appeared, it was my intention to have pointed out in this place, together with ſuch regulations as ſeemed to me, from a conſiderable attention to this pleaſing ſubject, moſt likely to obviate them; but I could not render them ſo perfect as to ſatisfy my own mind, in time for the preſent publication, which I was unwilling any longer to delay, from an apprehenſion that a bill would be brought into the Houſe of Commons by Mr. Gilbert ſoon after the Chriſtmas receſs, which appeared to me leſs adequate to the end propoſed. There is a principle in the human mind, which renders it impatient of controul; mankind in general may be induced almoſt to any thing; but he who attempts to compel them, will find it an Herculean labour.

By ſtrict diſcipline and the terrors of martial law, a body of men may be kept in a ſtate of mechanical ſubjection; but if the commanding officer does not convince them that he has their intereſt at heart, and that he harraſſes them no more than the ſervice neceſſarily requires, theſe men will deſert him at his utmoſt need. To ſecure their obedience, he muſt gain their affection; perſuade them they are of conſequence, and they become enthuſiaſts in your cauſe; in like manner convince the multitude that they can and ought to provide for themſelves, and *they will provide for themſelves.*

I ſhall not loſe ſight of this pleaſing ſubject,* but if the foregoing outline meets the public approbation, or ſeems likely to be adopted by the legiſlature, I ſhall in due time throw out ſuch hints as appear to me likely to render it ſucceſsful; together with ſome obſervations (as a conſequence of the former) on a probable mode of paying off fifty millions of the national debt, in the courſe of twenty years, without levying any tax which can be felt as a freſh burthen by the people.

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* Since writing the above I have read ſome Inquiries concerning the Poor, made with equal judgment and humanity by John M'Farlan, D. D. of Edinburgh; which are well worthy the attention of the publick.

So far this ingenious and valuable author.

The picture he has drawn of the reſources to be found by a provident management of the poor, is pleaſing in a high degree. His remarks on human nature, in connexion with his facts, are ſolid and judicious. His ſcheme for a general contribution monthly, in aid of ſuch a fund as he contends for, has the moſt flattering appearance of ſucceſs. Happy would it be for this country, were it voluntarily reduced to trial, in every town or diſtrict, where the experiment is moſt eaſy; from ſuch experiments more real knowledge would be gained, more general certainty would be eſtabliſhed, than from a thouſand theoretical ſpeculations.

Nothing is more eaſy than for a few trials to be made in ſmall manufacturing towns, and in country diſtricts where agriculture is the chief employment of the poor. This at leaſt muſt be allowed to be true, as to the mode of proceeding, the general earnings of the poor coming weekly through the hands of the gentlemen, tradeſmen, and farmers, near whom they live. But a ſerious doubt has ariſen, whether farmers ſervants be not worſe paid for labour than any other, and conſequently leaſt capable of ſparing a ſmall weekly contribution? If this be the caſe, it is a ſubject of much regret, ſeeing that of all deſcriptions of labourers theſe are the moſt uſeful and eſſential. This ſubject is worthy of general conſideration; and a general agreement in moſt counties, to increaſe the pay of labourers in huſbandry, ſeems indeed, from the common ſenſe of the publick, to be neceſſary. It may be a difficulty to fix the point at which a provident poor man might be unable to ſpare three-pence per week out of his income, without oppreſſing himſelf or ſome of his family; but undoubtedly, in the common courſe of nature's wants, there is ſuch a point; to prevent, however, the knowledge of it, is both more wiſe and more virtuous, than to wiſh to have it aſcertained! Give him the *power* of contribution, and then the uſe of it may be fairly expected. By a cordial agreement of maſters to point out the advantages of ſuch a plan, and to employ in preference thoſe labourers who ſhould conſent to it, conſent muſt become general. From the readineſs which the poor in ſome places have ſhewn to incorporate themſelves, and the idea they eaſily admit, that to provide againſt adverſity is advantageous and honourable, we would hope there would ſeldom be found a murmuring diſpoſition. And if their maſters and the principal inhabitants were generally, by way of encouragement, to contribute in common with them, the plan would become highly popular and pleaſing.

Should it be objected againſt ſuch a plan, that it would go to the making of the fund too large, which might occaſion relaxation among the poor contributors; it is anſwered, 1ſt. Let the wealthy contribute only ſo far as always to keep the fund up to a certain ſum, proportioned to the number of contributing labourers; or, 2dly; Let the wealthy contribute at pleaſure, and let the amount, over and above the aſſumed ſtandard of proportion be conſtantly divided once or twice a year among the poor contributors, according to their number of children.

Either rule might be adopted, as moſt ſuitable to the circumſtances of the pariſh or diſtrict; but the latter may be found the moſt uſeful, as being moſt liberal in its principle, and as tending to ſtrengthen the affection of the poor to their benefactors, which is the ſureſt bond of good faith in ſociety.

Laſtly; Such a concurring meaſure would bid fair to ſecure, almoſt beyond a poſſibility of miſcarriage, the original purpoſe of funding; the plan being thus rendered doubly encouraging to the poor, that eaſe and energy of mind, which make perſeverance a pleaſure, may be expected to remain undiminiſhed:—for an individual to flag, would be to expoſe himſelf to the reproach of all around him.

The conſtant recollection that the fund is augmenting by the contribution of thoſe not likely to diminiſh it; or if not conſtantly augmenting, at leaſt attentively aided by ſuch perſons; would fill moſt of the poor with *gratitude*, which on the preſent plan of intercourſe is not deemed a very common virtue among them. But this animated affection, once excited, will be kept alive without difficulty, by the continued benefits found to reſult from the connexion between themſelves and their benevolent ſuperiors. Under ſuch a patronage the moſt worthy among the poor would become improved into ſtill better examples to the leſs worthy. Emulation, then, inſenſibly ſlides into the boſom of the ſlothful, and of conſequence their moſt obnoxious habits become gradually corrected. All the laborious part of a diſtrict, on ſuch a plan, would be animated to ſtrive as in one common cauſe, feeling one common intereſt, looking to one common ſecurity! The ſmall deduction of three-pence per week would be compenſated by the triumph that the idea of *a fund of their own* would inſpire. Their children would naturally catch ſomething of the ſenſation, and be more prompt and alert in their little exertions. The principle of independence, ſo congenial to the human mind, thus foſtered, would grow with their growth, and ſtrengthen with their ſtrength. The moral effect of this principle, rightly cheriſhed, is a wonderful improvement of the mind itſelf, and would be found not only the moſt powerful ſtimulus to induſtry abroad, but to the beſt œconomy of the family at home. From a general courſe of provident attentions, a growing *diſlike* to the oppoſite habits, ſuch as, the frequenting of wakes, and other periodical aſſemblies for idle purpoſes, may be expected, till a uniform regularity of meritorious and virtuous conduct might be found, where idleneſs, vice, and miſery, had formerly dwelt.

Where a habit of tippling at the ale-houſe prevails in the father of a poor family, it is of ſmall conſequence to the comfort of that family how much or how little he earns, or whether the articles of ſubſiſtence be dear or cheap; wretchedneſs muſt attend his family. All that ſuch a man will earn, or filch, is eaſily conſumed by himſelf, and conſumed under a grovelling and ſtupid notion that to endeavour to ſave any thing is vain; or if attainable, that there is a greater good in the waſte or indulgence of the preſent moment.

It may indeed poſſibly be objected, that malt liquor is the natural beverage of this country, and that by a rigid diſcouragement of drinking ſtrong beer, the conſumption of barley would be leſſened, and the landed intereſt thereby ſuffer. It ſhall be readily granted that malt liquor *is* the national beverage, and that a check to the growth of barley is not to be haſtily hazarded; but ſuch an evil, if it be one, may poſſibly be guarded againſt in a conſiderable degree, by attempting an alteration in the mode of conſumption,

The ſtate of *malting* and *brewery*, under this ſpeculation, comes naturally into conſideration. It is now the policy of the legiſlature to lay ſo heavy a duty on malt,* as wholly to exclude from poor, and almoſt from middling families, in towns eſpecially, the ancient practice of brewing for themſelves. Thus it comes to paſs that, comparatively, few private families or even publicans brew. I will not ſay that in the article of ſtrong beer, eſpecially now porter is ſo generally brewed out of London, the publick is under any material diſadvantage from the parliamentary ſyſtem. Certain it is that a ſubſtantial common brewer of ſtrong beer and porter, on a large ſcale of buſineſs, can now brew cheaper and better than a ſmall one. And conſidering the high duties on the ſtaple articles of brewery, it is rather a matter of ſurprize that beers of the various degrees of ſtrength, ſhould be rendered on the whole ſo good as they really are, at the prices they are ſold for.

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* Since this was written three-pence per buſhel has been taken off; but the reduction is ſo ſmall, that little alteration will ariſe in the line of conſumption.

But it is worthy of conſideration whether an equal conſumption of malt may not be obtained by a different uſe of breweries from that which prevails at preſent, and the nation, including the bulk of the poor, for whoſe advantage we are now concerned, be better, that is more generally and uſefully, ſupplied with malt liquor. On the preſent ſyſtem, in country towns and diſtricts eſpecially, the alternative is nearly this: ſtrong beer, or no beer at all; for any thing below the deſcription of ſtrong beer is with difficulty to be procured. Hence water, for a common beverage, is frequently drunk in poor families, where ſtrong beer, on account of the man's irregularities, cannot be afforded. And perhaps a hankering prevails in him after ſtrong beer, beyond what might be the caſe if a ſupply of freſh and palatable ſmaller beer could be readily obtained. This hankering after a favourite liquor is augmented by the difficulty of procuring it in common. And when a poor man once breaks out of his buſineſs, and gets to the alehouſe, he is frequently ſtimulated with a deſire of an immoderate quantity, incurs an expence equal to what might ſupply his whole family with good table beer, loſes his time in drunkenneſs, (which loſs of time is alſo a publick loſs to the community) injures his health and morals, and prevents the poſſibility of harmony

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in his family. The landed intereſt, then, in this part of the conſumption of barley, and that of the revenue in the conſumption of malt, are ſo far forth ſupported by *irregularity*, *miſery*, and a waſte againſt the wall.

To obviate theſe objections, and ſerious evils to the poor, (which are alſo connected with evils to manufactures, and conſequently to the national intereſt) would it not be ſound policy to encourage the ſetting up of ſmall-beer breweries in country places and manufacturing towns? As an article of large profit, the brewing of ſmall beer for ſale in ſuch towns and places, may not be held out as greatly inviting; nor is it perhaps of conſequence, or at all deſirable, that it ſhould. In a national and moral point of view, it may be quite as deſirable that ten or twenty members of the community ſhould get a decent ſubſiſtence upon an equality of trade, as that one ſhould acquire a large fortune, while many others ſhall be his labourers in the manufacturing of an article. And yet in large towns, and for the ſupply of large towns, with a liquor of all others moſt pleaſant and uſeful to Engliſhmen who can afford to drink it, large and ſkilful brewers of ſtrong beer will always be encouraged, and it is deſirable they ſhould be. Neither do I conceive it would be an evil if ſuch men were a little to raiſe the price of ſtrong beer, I mean only the finer pale beer of this country, and give the conſumer an equivalent in age, ſtrength, and ſtudied excellence of flavour; which might tend to check the now immoderate uſe of a foreign, and frequently ſpurious noxious article, under the name of red-port. The conſumption of this article of late years, and perhaps we may alſo ſay the more unwholeſome article of French brandy, is a national diſadvantage, as well as a moral one. For they are articles which are againſt a favourable balance of trade, and induce luxury and diſeaſe.

But though, as was hinted before, the *profit* of merely ſmall-beer breweries, eſpecially on that contracted ſcale which ſome ſituations will require, may not be inviting, yet it ſhould be remembered that as things are great or ſmall by compariſon, a profit which to large brewers would be unworthy of notice, might be uſeful and ſufficient to another man of ſmall property, ſmall views, and in the habits of manual labour. And it is preſumable that by a little encouragement many would be found ready to embark on ſuch a ſcale of brewery, merely for a ſcanty livelihood, or to employ a part of their time; the experiment is eaſy, and may be worth the trial.

It may be objected that a man in narrow circumſtances cannot purchaſe caſks, and the neceſſary apparatus for ſelling beer in barrels, or half or quarter barrels, more eſpecially as the expence of delivery would be a ſerious one, and the riſque of not being paid more ſerious ſtill. But if only one perſon in a ſmall compact village, whoſe houſe ſhould be favourable to the undertaking, or two or more in a large and extenſive pariſh, were once eſtabliſhed, with a ſmall ſtock of caſks, and to ſell the beer to thoſe who ſhould fetch it by the quart or gallon, it ſeems probable that ſuch a plan would be found very convenient to the poor, who might be furniſhed juſt as they may happen to want, and in a manner the moſt compatible with their circumſtances. A poor family, which, without ſuch a plan, could not conſiſtently with their income have any beer at all, might on this lay out from one penny to ſix-pence without trouble or loſs of time; and having this beverage would bo leſs likely to make a common beverage of *tea*, which, with the expence of refined ſugar and butter, is enough to impoveriſh the parents, as well as to enervate their offspring. But ſuch an eſtabliſhment of breweries, if uſeful at all, as it is preſumed they would be, muſt ſucceed beſt under the advice and encouragement of principal men in a pariſh, who will be the beſt judges of the qualification, proper diſpoſition, and ſituations, of thoſe who ſhould be induced to engage. It may not always be neceſſary, and certainly would not, for thoſe who embark to ſpend their *whole time* in ſuch an undertaking; much other uſeful buſineſs may be done, when brewing is ſuſpended, while a ſingle individual of the family might draw and ſerve out the beer to the perſons who fetch it. Such a plan, in large towns where common breweries are already eſtabliſhed, ſeems to be ſuperſeded, by the ſelling of this article at chandlers' ſhops; but the abundant convenience and great advantage of that ſupply, without the neceſſity of going to the alehouſe, is a ſtrong recommendation for an attempt to be made in a more extenſive manner. W. M.

It may be pleaſing to ſome gentlemen, to read any additional, and recent ſentiments of ſo ingenious a writer as Mr. Pew, on his favourite ſubject; his letter, therefore, reſpecting the inſertion of his pamphlet, is ſubjoined.

TO THE SECRETARY.

DEAR SIR,

I am much obliged to you for your polite letter, of the 24th inſtant, which I juſt now received, and feel myſelf highly honoured by the approbation which the Bath and Weſt of England Agricultural Society are pleaſed to expreſs of my ſmall pamphlet reſpecting *a better mode of providing for the Poor*, publiſhed in 1783; and if my feeble efforts can be of any avail, in ſeconding the endeavours of ſo reſpectable a Society, to bring about a more equal diſtribution of the bounties of Providence among *all* the ſons of men; I can aſſure you, that as it has been always an object indeed very near my heart, it will give me the moſt unfeigned ſatisfaction.

In that pamphlet I endeavoured to give, in the moſt *condenſed* form, the principal advantages, both poſitive and negative, which might reaſonably be expected from ſuch a regulation; and now, after the lapſe of eight years, I cannot call to mind any additional arguments which are likely to convince thoſe whoſe underſtandings the former ſtatement did not reach. If the Society do me the honour, therefore, (which I much wiſh) to inſert my paper in their next volume, I ſhould wiſh only to correct the few errors of the preſs as marked in the copy herewith ſent, and to add the two notes, which by ſome miſtake of the printer, were formerly omitted; for as to entering on the practical part, or framing a bill by which the plan might be carried into execution, it ſeems to me, upon reflection, not only to be highly preſumptuous in any individual, but might perhaps be conſidered as a direct inſult to the legiſlative wiſdom of this country, without whoſe aſſiſtance, I am clearly of opinion, no *permanent* or *very eſſential* advantages can accrue from it; but when I ſay this, I mean only to expreſs my own private opinion; for no one will be more happy to ſee ſuch additional arguments as may have ſuggeſted themſelves to any gentlemen of the Society.

Two difficulties ſeem to have occurred to ſeveral gentlemen, who I am ſure are my friends, and well-wiſhers to mankind; the firſt, as to the practicability of the ſcheme; the ſecond, as to its legality. In anſwer to the firſt, I can only ſay, that if government would furniſh me with the neceſſary powers, I would forfeit my life, or carry it generally into execution; and with regard to the ſecond, I confeſs I can ſee nothing more illegal or oppreſſive in taxing a man for the future contingent ſupport of *himſelf* and *his family*, than in taxing him directly for the ſupport of *others*.

I am, dear Sir, your's, &c.

R. PEW.

Shaſton, Dec. 29, 1791.

P. S. With

P. S. With the pamphlet I will ſend a copy of Dean Tucker's letter to Dr. Stonhouſe, on peruſing my plan; not out of oſtentation, but to ſhew how much that reſpectable politician coincides in opinion with the gentlemen of the Society and myſelf.

" *Gloceſter, Feb.* 11, 1783.

" DEAR SIR,

" I thank you for the peruſal of Mr. Pew's pamphlet; it is a well written, ſenſible performance; and if he can extend the ſcheme of frugal and provident clubs, ſo as to comprehend the whole, or even a conſiderable part of our national poor, he will, in my eſteem, deſerve more of his country and of mankind, than all the Marlboroughs, or Chathams, or Rodneys, that ever lived. I remember to have had a good deal of talk with the late Sir Oneſiphorus Paul, on this very ſubject. Sir Oneſiphorus encouraged theſe clubs as much as he could, and continued, I believe, a member of ſeveral of them till his dying day, in order to countenance them, and ſet a good example. But in converſation, we then concluded that they muſt be voluntary aſſociations, and not compulſory aſſemblies; that they were moſt practicable in manufacturing diſtricts, far remote from the vortex of electioneering boroughs, (which is the caſe of Stroud in Glouceſterſhire) and that they might be introduced to good purpoſe into towns of 5 or 600 houſes, but could hardly ſuit with thoſe of 5 or 6000.

“ The affair of granting certificates to the members of any of theſe clubs, to remove to other places if they choſe to go, (a liberty that ought never to be denied them) is at preſent another difficulty, which I wiſh to ſee well removed, and the law altered which enables a churchwarden, a conſtable, or an overſeer, to prevent a perſon of another pariſh from ſettling among them.

“ Therefore, with my beſt wiſhes of ſucceſs to the author's laudable endeavours,

“ I remain, dear Sir,

“ moſt ſincerely yours,

“ J. TUCKER.”

“ To the
“ Rev. Dr. Stonhouſe, M. D.
“ Briſtol.”

ARTICLE XXV.

A Plan for the better Maintenance and Regulation of the Parochial Poor.

> " The number of indigent perſons being greatly increaſed, by
> " withdrawing the alms of the monaſteries, a plan was formed
> " in the reign of Queen Elizabeth, more humane and benefi-
> " cial than even feeding and clothing of millions; by affording
> " them the means (with proper induſtry) to feed and to clothe
> " themſelves. And the farther any ſubſequent plans for main-
> " taining the poor have departed from this inſtitution, the
> " more impracticable and even pernicious their viſionary at-
> " tempts have proved." *Blackſtone's Com.* iv. 432.

TO THE SECRETARY.

SIR,

LOOKING over the liſt of premiums of your reſpectable Society, I obſerve one is directed for the improvement of the Poor Laws. This has put me on recollecting ſome circumſtances, which, in the courſe of near twenty-five years practice as a juſtice of the peace in the county of Hants, have occurred to me as likely to conduce much to the comfort of the poor, by making them more induſtrious than they are found to be at preſent; and alſo to introduce a laudable emulation and ſpirit of good order among that uſeful part of the community. The propoſitions are but few in number, but ſeem to me to be effectual to the point in view. The propoſal is as follows:

1ſt. That in a bill to be brought into parliament, clauſes may be inſerted to authorize the juſtices of the peace to order a bounty on work, in certain caſes, with a view to producing better effects than by giving money to the poor.

1ſt. *This has been put in practice (by recommendation) for near fifteen or ſixteen years paſt; and has been found to produce an excellent effect. So that three ſhillings per week diſpenſed by the overſeers, but thought inſufficient for the ſupport of a family, conſiſting of ſix people, have, by a different mode of diſpoſal, in the way of bounty, produced the comfortable income of nine ſhillings per week for the ſupport of the ſame family. But later experience, introduced by the advice of a manufacturer, has abundantly evinced, the greater benefit of proportioning the propoſed bounty to each ſhilling earned, as the latter methods apply to the quality of work as well as the quantity. The former to quantity only.**

2dly. That certificates given agreeably to the Act of the 8th and 9th of King William the Third, and other ſubſequent acts, for the amendment of the ſame, be hereafter limited to ſhort terms of years. See Gilbert's plan, 1781.

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* *Illuſtration.* A. and B. are ſet to ſpinning, and are promiſed a bounty on their work, in the proportion of ſixpence bounty to each ſhilling earned. A. draws her work to a fineneſs of 1s. 6d. per pound, and B. only to 1s. A. of courſe is entitled to nine-pence, while B. deſerves only ſix pence.

2dly. *The uſe of this is ſo very obvious, and promiſing of improvement, that it is ſuppoſed eight or ten certificates will be granted under the limitation, inſtead of one in the preſent mode. And thereby the number of induſtrious people in the nation will be much increaſed. As it is found on obſervation, that the certificated labourers are abundantly more active and induſtrious than the ſettled inhabitants. And, further, that if ſuch certificate be granted for a year only, the juſtices of the diviſion may enforce the granting it.*

8th and 9th William III. *Cap.* 30. } *3dly.* That a diſcriminate and ſpecial uſe of the badge be applied by the overſeers, with the conſent of the majority of a veſtry, (ſubject to appeal to the diviſion or diſtrict juſtices, at their petty ſeſſions) as a cenſure and puniſhment to the diſorderly and lazy poor only.

3dly. *It is ſuppoſed that a creditable mark or token of diſtinction might alſo be added with excellent effect. As a reward, for inſtance, to an induſtrious labourer, or an ingenious artiſt, who has bred up a numerous or conſiderable family in a reputable manner, without* *aſſiſtance from the pariſh in which he is ſettled. Some real benefit may alſo be added thereto—ſuch as, an exemption from highway duty for a certain time, or for ever, as in the caſe of militia-men enrolled in their own right, and not as ſubſtitutes. Other uſeful ſervices to a neighbourhood may likewiſe be rewarded in the ſame manner; as for inſtance, to thoſe who proſecute or make diſcovery of perſons guilty of miſdemeanours, and the ſeveral degrees of larcenies and felonious offences.*

Theſe obſervations are ſubmitted to the conſideration of the publick, as conſtituting an expedient for the better management and regulation of the poor of this kingdom. And it is preſumed that, by theſe means, the general body of the poor may be ſupported in the proportion of half the expence which has been incurred, on their account, for any given period of time within the laſt ſeven years; that better order and regularity will be eſtabliſhed and kept up among them; the national ſtock of induſtry increaſed; that the plan is eaſy, ſimple, and ſpeedy in its execution; and laſtly, that the largeſt county in the kingdom will not require *one hundred pounds* to carry the plan into practice, as the meaneſt cottage will, by the bounty propoſed, become a workhouſe for one family, ſo long as it will be wanted: a circumſtance, it is imagined, of no ordinary conſequence, at a ſeaſon when the kingdom has been put to large and heavy expences on account of improving gaols and publick priſons.

This, Sir, is the reſult of my obſervation; and, I truſt and believe, it contains hints that would be found effectual to the intended purpoſe. If it ſhould meet with the approbation of the committee, I own I ſhall think myſelf honoured by their good opinion; but if it ſhall only be the means of urging ſome more experienced perſon to propoſe a better plan, the community will receive the greater benefit, and I ſhall be a partaker of the general good, as an individual.

I am, Sir, your moſt humble ſervant,

THOMAS HALL.

Preſton-Candover near Odiham,
Hants, May 12, 1792.

P. S. It is ſuppoſed that this plan will operate peculiarly in manufacturing towns; where there are aged or ſinking manufacturers; and will enable a maſter to reward merit, or ſupport the diſtreſs of an individual labourer, without danger of advancing the general price of labour.

Article XXVI.

On the Damage of Fir-Plantations; in reply to the enquiry inſtituted by this Society, as before alluded to by Mr. Davis of Longleat.

TO THE SECRETARY.

Sir,

UPON reading over the minutes of the laſt general meeting of the Bath Agriculture Society, as advertiſed by you the 14th June laſt, I obſerved that the ſociety had received information from Mr. Horner, that his fir-plantations at Mells park have of late years ſuffered in a very alarming manner by ſquirrels preying upon the bark, whereby great numbers of his fineſt trees have been killed, and a general deſtruction threatened; and that the ſociety, wiſhed to inſtitute an enquiry how far other gentlemen's woods have ſuffered from the ſame cauſe, and would be obliged by any communications on the ſubject.

Happy in complying with the wiſhes of my brother members of the ſociety, I take up my pen to inform them, that I have been a fellow-ſufferer with Mr. Horner, for near theſe dozen years laſt paſt, in my fir-plantations at this place, from the ſame deſtructive animals.

Many years ago, thinking the ſquirrels very harmleſs creatures, and liking to ſee them ſpring from tree to tree, I gave orders that none of them ſhould be deſtroyed; by which means they increaſed exceedingly. I found no inconvenience enſue, till about 10 or 12 years ago; when, after a long and ſevere winter, I took notice one day, in going round my walks in the wood about the beginning of April, that ſeveral of my young Scotch firs, which had then been planted about 15 or 16 years, and were very thriving trees, were ſtripped of their bark in ſeveral places, and the ſtrips of the bark five or ſix inches long, lying at the feet of the trees. I at firſt thought that ſome roguiſh boys had been playing tricks, but upon further examination I found the trees in many places were ſtripped ſo high up, that no boys could poſſibly have got at them: at laſt, after watching ſeveral times in order to find out what could damage the trees in this manner, I caught the ſquirrels in the fact of ſtripping and tearing off the bark, and throwing it upon the ground. I never perceived any of my trees thus injured before; but ſince they have begun, they have never failed more or leſs to attack my fir-trees every year both ſmall and great. Of one whole plantation of Scotch firs, of about 2500, which I planted out in the year 1766, there is ſcarcely a tree has eſcaped their ravages.

Wherever they bark the tree all round, there is a diſcontinuance of a due circulation of the ſap, and that part of the tree, which is above the injury ſuſtained, dies, and is generally broken off by the firſt high winds in the enſuing winter; and the trees, deprived of their tops, make a moſt unſightly appearance and are ſpoiled. Beſides theſe younger trees that are thus barked, I have many large trees, of at leaſt 50 years growth, which are in like manner damaged, by theſe miſchievous animals, in their upper branches and leading ſhoots.

I have particularly obſerved that theſe animals attack no other ſpecies of the fir or pine kind but the Scotch fir, notwithſtanding the Scotch fir has the rougheſt and hardeſt bark of any. The ſpruce, the ſilver, the Weymouth, the larch, the pinaſter, and the cedar of Lebanon, though intermixed occaſionally with the Scotch in my woods, remain unattacked and unmoleſted by them. I have obſerved too that the ſquirrels never begin their attacks till about the beginning of April, and generally ceaſe from their deſtructive works about the latter end of May.

From this circumſtance I have been induced to draw this inference; that theſe animals, which are known to lay up in the autumn their hoards of nuts, cheſnuts, beech maſts, acorns, &c. for their winter conſumption, never attack the firs while they can get ripe fruits in the ſummer, or while their hoards remain unconſumed in the winter; but that as ſoon as their winter ſtores are exhauſted, which will ſometimes happen in long and hard winters followed by a late ſpring, (as was the caſe when they firſt attacked my fir-trees 10 or 12 years ago) they are driven by neceſſity to ſeek for food wherever they can find it. This neceſſity probably firſt prompted them to try what the Scotch fir might produce; and having once taſted the reſinous particles, they reliſhed it ſo well, that they have ever ſince reſorted to the ſame ſource of ſupply whenever the calls of hunger urged them to it. What further perhaps induces theſe animals to apply to the Scotch fir in preference to the other ſorts of firs, may be the ſimilarity of taſte between the ſeeds of the Scotch fir cones, (of which the ſquirrels are remarkably fond) and the reſinous particles which lie beneath the inner rind of the Scotch fir; for it is, I apprehend, theſe reſinous particles which they eat, and are in ſearch of when they ſtrip off the bark, and not the bark itſelf, which they always reject and throw down. After mild winters their ravages are not ſo great, their hoards not being ſo ſoon exhauſted; to this reaſon I impute it that my trees have eſcaped this ſpring (after ſo mild a winter as the laſt) without ſuffering much damage. Having thus pointed out the miſchief, and in ſome meaſure accounted for the cauſe of it, I wiſh I could as eaſily point out the remedy.

The deſtruction of the animal of courſe is the firſt that offers itſelf; but that is not, in large woods eſpecially, ſo eaſily accompliſhed. There are various ways, by which their numbers may be diminiſhed, but in the ſhelter and harbour of extenſive plantations, their agility and their cautious ſhyneſs and cunning, will baffle all our endeavours; however, they may be greatly leſſened by degrees, and in time perhaps in a great meaſure extirpated, either by taking their neſts and deſtroying their young year after year, when they can be got at, which is not always to be done, as they generally build their neſts at the extremities of the branches; or by hunting or ſhooting them. But where they are numerous, all theſe methods will hardly be ſufficient, unleſs purſued by an unremitting perſeverance. If any more effectual method can be thought of for deſtroying theſe animals, I ſhall be very gald to be made acquainted with it.

Thus I have committed to paper ſuch particulars as have occurred to my obſervation relative to theſe deſtructive creatures; which I muſt beg you will lay before the ſociety at their next meeting, with my moſt reſpectful compliments.

I am, Sir,

Your moſt humble ſervant,

JAMES BERNARD.

Crowcombe-Court, July 6th, 1791.

ARTICLE XXVII.

On the ſubject of the foregoing Article, Planting, &c.

Saliſbury, Oct. 6th, 1791.

SIR,

I Have taken every opportunity of enquiring into the matters ſtated in your letter of the 30th of July. Some injury, as I have been informed, was done by ſquirrels to the fir plantations of Lord Arundell, of Wardour, as much as ten or twelve years ago. The plantations of the Earl of Aileſbury, at Tottenham-park, have alſo been attacked in like manner. The damage complained of is, however, I believe, far from being general; nor have I heard of it in ſo great a degree as that which you mention.

Very few plantations, except ſmall ornamental ones, have been made in this neighbourhood.

The raiſing of oak timber for future navies was, I know, conſidered as an object of great national importance by John Pitt, eſq; late ſurveyor-general of the King's woods and foreſts; who directed his attention to planting part of thoſe unprofitable lands. Near twenty years ago he ſelected two thouſand acres for planting in different parts of the Foreſt of Dean, and one thouſand acres in the New Foreſt. The land was incloſed for that purpoſe at a very conſiderable expence. Since receiving your letter I have ſeen part of thoſe plantations in the New Foreſt, and have been well informed reſpecting the remainder. I am truly ſorry to add, that they appear to have been neglected, expoſed to damage, and are now in a deplorable ſtate.

The growth of timber in general, and oak timber in particular, is, I fear, much on the decline. Rough uncultivated land is the natural nurſery of a young oak; but every ſoil is not well adapted to its growth. When ſuitable land is farmed out, an induſtrious tenant will probably clear, and bring it into cultivation. If left in its uncultivated ſtate, cattle are turned in, and deſtroy the young plants. It has generally been held that an oak does not remove well. The ſurveyor-general before mentioned, who paid great attention to his own plantations, informed me that by removing an oak twice or thrice, when very young, and each time cutting off the tap or principal root, it would afterwards proſper as well as any other tree.

It ſeldom happens that timber is raiſed on farms let out to tenants to cultivate, except particular attention be paid to it by the landlord or his ſteward. It is not merely the giving orders for a number of trees to be planted that I mean. The man who ſucceeds muſt plant that which is ſuitable to the ſoil, preſerve it from damage, and take pleaſure in ſeeing it flouriſh. There are few ſorts of timber proper for hedge-rows. Perhaps elm generally ſucceeds the beſt, and does the leaſt damage to quick fences. When a hedge is new plaſhed, the labourer cuts off many young ſaplings, which would, if let ſtand, make timber. It is good policy to give theſe men a ſmall gratuity for every dozen of ſaplings that they ſpare. This is actually practiſed on the eſtate of the Marquis of Bath, through the good conduct of his ſteward, one of our worthy and very intelligent members. After trees are planted, or led up in this manner, it requires particular attention to preſerve them. They are ſometimes deſtroyed by cattle biting off the young ſhoots, or rubbing againſt them; and are frequently ſpoiled for timber by being lopped, ſhrouded, or headed, by the farmer or his ſervants. The timber which is raiſed belongs to the landlord, nor is it the intereſt of the tenant to encourage its growth. The dropping of trees frequently deſtroys his quick fences, and their ſhade conſiderably injures his land. When a tree is converted to a pollard, by taking off the head, or mutilated by lopping or ſhrouding, it does leſs injury, and the farmer has generally the privilege of taking the lops and ſhrouds for his own uſe. A ſtrict attention, with proper covenants in the leaſe, may prevent theſe abuſes. On the contrary, tenants who carefully nurſe up young timber ſhould be encouraged by rewards, or allowances; or by occaſionally aſſigning them timber for their uſe.

As the raiſing of timber on farms requires more attention than it generally receives, and the royal foreſts have, I fear, been too much neglected, it is to noblemen and gentlemen who hold large tracts of wood-land in demeſne that poſterity muſt be indebted for this moſt valuable article. In the management of this ſort of property there are, however, two extremes which ought to be avoided. The firſt is that of leaving no ſaplings, when the coppice or underwood is cut; or, if left, ſhamefully cutting them down with the next fall of underwood, on the ſame ground, which in ſome places is a common practice. The other extreme is that of leaving too many ſaplings, and not thinning them in proper time. It is of great conſequence that young trees ſhould be *gradually* thinned out, as they increaſe in ſize; taking away the ſmall, ſtunted, or unkindly trees, and letting the largeſt and moſt flouriſhing remain. This operation ſhould commence time enough to let the branches ſpread into a good head. When trees ſtand thick together, they run up like poles; the branches periſh whilſt young, and it is then too late to begin thinning: ſuch trees never make timber. Whatever be the age or ſize of trees, in a coppice, the diſtances ſhould be ſuch as to admit of a free circulation of air between the extreme parts of the branches. Even in hedge-rows, where they have the full benefit of the air on two ſides, trees ſcarcely ever flouriſh when they ſtand thick together.

There are very few eſtates where ſome ſpots of land may not be found that will anſwer better for planting than for any other purpoſe. If the owner of ſuch land be not in immediate want of its annual produce, he cannot lay out his money more beneficially for his family than by planting it with trees ſuitable to the ſoil. Should the eſtate be diſpoſed of, the young timber will, on a valuation, generally be found to pay great intereſt for the money ſo employed.

The London ſociety has meritoriouſly held out honorary rewards to thoſe who diſtinguiſh themſelves by planting. Noblemen and gentlemen would do well to follow ſo good an example, by encouraging farmers and workmen who plant, nurſe up, and preſerve young trees; remembering that it is not planting alone, but care and management, that muſt enſure ſucceſs; and thereby prevent that national ſcarcity, which might prove a ſerious evil to poſterity.

I am, Sir,

Your obedient humble ſervant,

BENJAMIN PRYCE.

To Mr. Wm. Matthews, Secretary.

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ARTICLE XXVIII.

The ſame Subject continued.

TO THE SECRETARY.

SIR,

IT has been obſerved that fir-trees in Lord Aileſbury's plantations, particularly Scotch firs, have been barked in the manner deſcribed in your circular letter; generally at the bottom of the leader of each branch; the ground under ſome of the trees has been covered with the woody parts that have been chewed, in ſuch quantities, that a peck or more might be collected under one tree. This miſchief has been found to be more frequent, in ſeaſons when there has been a large breed of ſquirrels, and at a time when it may be ſuppoſed their autumnal collections have been exhauſted; and about four years ago, when ſquirrels were uncommonly numerous about Tottenham-park, upwards of fifty trees, called Hornbeam, were barked in the trunks and branches a conſiderable way down, which occaſioned moſt of them to die. The injury we at firſt ſuppoſed to have been done by a racoon, which eſcaped from a gentleman's houſe in the neighbourhood, and went towards Tottenham-park; but I do not find there was any good ground for believing ſo much execution could have been done by one animal.

This miſchief, however, in Lord Aileſbury's neighbourhood, has been inconſiderable, in compariſon with that done to the plantations of the gentleman alluded to by your letter. Plantations here have ſuffered much more material injury, by not having been properly thinned on growing up. Gentlemen, whoſe diſpoſition leads them to make plantations, have ſeldom reſolution enough to make uſe of the ax as they enlarge, and the conſequence is, that the trees run each other up into ſtriplings, and ſeldom if ever make fine timber; yet it is neceſſary they ſhould at firſt be planted pretty thick, eſpecially in expoſed ſituations for ſhelter; and if horſe cheſnut, Scotch fir, ſycamore, and other faſt-growing trees of ſmall value as timber, are planted with better kinds of trees, they will pay well to be thinned out, and furniſh no temptation to the owner to keep them growing too long.

I am ſorry to ſay, that except on ſome parts of the eſtate of Lord Aileſbury, who for the laſt thirty or forty years has paid unremitting attention to this important article, the ſtate of oak and other timber in this neighbourhood is not to be boaſted of; and even on his manors, it is ſometimes a difficult matter to prevent the lopping and pollarding timber-trees, particularly of aſh, which will burn while green.

The raiſing of young timber on eſtates has not been ſufficiently attended to. Land-owners knowing they have little chance of living to cut down and ſell the tree they are at the expence of planting, do not often conſider, that their eſtate is notwithſtanding increaſed in value and improved in beauty by being well planted, and conſequently would at any time ſell for abundantly more than would repay them the firſt expence of planting with intereſt. But tenants for life or years have no great inducement to improvements of this ſort; on the contrary, they would incumber their lands without any profit; and this generally occaſions them to be as backward in raiſing timber, as they are induſtrious in pollarding what does get up.

Lord Aileſbury has introduced a covenant in his leaſes, whereby his tenants engage to plant and preſerve a certain number of trees yearly, in proportion to the ſize of their eſtates; but even this is not fully complied with, and he has lately employed a perſon to go over his farms, to ſeek out the fitteſt places in hedge-rows, &c. for planting, and afterwards ſent plants from his own nurſeries, and had them planted. The ſame perſon marks for reſerves any ſelf-planted trees he can find in the coppices and hedge-rows that come in courſe for cutting, to ſave them from being cut down with the underwood.

The ſoil in this part of the country has not in general ſufficient depth to produce fine oak timber; where it does grow well, as in Savernake-foreſt, it ſeems peculiarly well adapted for knee-timber; but from the want of water-carriage, and of a purchaſer at hand, many a valuable lot of good knee-timber is uſed for the moſt inferior purpoſes of repairs, gate-poſts, &c.

As I have no knowledge in naval affairs, I can form no judgment in what reſpect Spaniſh-cheſnut, elm, or larch, may be ſubſtituted to advantage for oak. Spaniſh cheſnut, I have underſtood to be nearly as good as oak; but it is not a much faſter growing tree, except while young; I believe it requires nearly as good a ſoil, and it does not do well except in ſheltered ſituations, and is apt to ſhoot out in ſeveral ſtems from the bottom; which muſt retard and weaken the growth of the plant, 'till one leader overpowers and deſtroys the other ſhoots. In Lord Aileſbury's plantations the Spaniſh cheſnut has run up with other trees, and makes a pretty reſpectable appearance; but where it grows ſingle it is generally ſtunted. There are ſeveral of theſe trees in Brimſlade-lawn, near Burbage, the largeſt of which meaſures 13 feet 2 inches round the ſtem, at four feet from the ground, and yet the top makes but a mean appearance for ſo large a trunk. I ſuppoſe our climate is too cold for this kind of timber, which the above circumſtances, as well as that of the fruit ſeldom or never ripening, ſeem to evince.

Elm, where the ſoil is ſuited to it, is a very profitable tree; it does beſt in ſandy land; may be planted in hedge-rows with leſs injury to the quick-hedge than any other tree; and when once planted, the ſucceſſion may without trouble, and with very little care, be continued for ever, by ſuffering the ſhoots that riſe ſpontaneouſly from the roots to grow up; and this tree has not the property of burning green—it is however the almoſt univerſal practice of farmers to ſtrip off its branches, which not only extremely disfigures, but greatly injures it, and ſhould not be ſuffered.

As to larch, from every obſervation I have made and heard, it ſeems clear, that it is one of the moſt profitable trees that grows. In Lord Aileſbury's plantations, where it has been raiſed with other firs, almoſt every larch may be ſeen above the reſt of the trees. It grows well, even upon thin, gravelly, or heathy land. The ſtem is ſtraight and clean, and the deal it cuts into is nearly, if not quite, as good as foreign. This tree, except in gentlemen's pleaſure-grounds, has been very little cultivated in our neighbourhood. I hope, however, that thoſe Lord Aileſbury has planted, and intends planting, will attract the notice and attention of his neighbours, and occaſion their more general cultivation. He has appropriated *two hundred and forty-three acres* of new incloſed land, near Great-Bedwin, called Wilton-Braild, which is now ſtaked out, and is intended to be planted the enſuing winter with all kinds of timber, particularly larch, oak, and Spaniſh cheſnut. The land is peculiarly well adapted to the growth of timber, and I doubt not will in time, with his other improvements in the planting way, become a moſt valuable addition to the property of his Lordſhip's ſucceſſors, an ornament to the neighbourhood, and a publick benefit to the country.

I am, Sir,

Your moſt obedient ſervant,

JOHN WARD.

Marlborough, Oct. 10, 1791.

P. S. Lord Aileſbury is purſuing the ſame ſyſtem of planting on his Yorkſhire eſtate, where oak timber grows in great perfection.

ARTICLE XXIX.

On Shetland or Zetland Sheep and Wool.

TO THE BATH AGRICULTURE SOCIETY.

GENTLEMEN,

TO a Society ſo eminently diſtinguiſhed for its laudable exertions, and its beneficial conſequences as yours, every addreſs ought to contain ſomething conducive to the good of mankind. If the following come not ſo recommended, it deſerves at leaſt the praiſe of a good intention.

The ſubject is the celebrated Zetland Wool, with a ſcheme the moſt likely to make it advantageous to this kingdom in general, and a ſupport to that iſland in particular.

Zetland extends from more than 59° to more than 61° N. L. and as it lies in an oblique direction is conſiderably longer than a degree; its breadth is variable, from 6 miles to 20. It is compoſed of a number of iſles interſected by ſounds and firths, which are ſtored with an abundant variety of fiſh; and the harbours are the beſt in Europe. The ſea is very ſtormy, eſpecially in winter, when the ſpray is carried over a great part of the iſland, and renders the graſs peculiarly good for feeding; this likewiſe prevents the ſnow from lying long on the paſture grounds; but entirely mars the growth of trees. It is inhabited by about twenty thouſand people, who depend upon the ſummer fiſhing, and knitting of ſtockings, for their ſcanty and precarious ſubſiſtence; the fiſh is ſent to Barcelona, Leghorn, or Hamburgh; and the ſtockings ſold to the Dutch fiſhermen, or ſent to Hamburgh; and the fine ſtockings to Edinburgh, where they ſell from three ſhillings to one guinea and a half a pair.

The landholders let their lands from year to year, on condition of ſome perſonal ſervices, and all their product at a ſmall price in the option of the buyers, who are often tackſmen, and rent the people's ſervices at about 500l. for forty or fifty boats with ſix men each.

The people are ſaid to be indolent; the reaſon of which is, that the landholders, by a barbarous policy, and by a variety of means, contrive to bring them into debt, to prevent their leaving their country; [N.B. Few of the people can either write or number; for the ſame policy prevents good ſchools being kept:] and they, deſpairing of independence, become hopeleſs and indolent.

The ſheep are ſmall, and diſtinguiſhed from other ſheep by marks unneceſſary to relate;—are ſubject to few diſeaſes; and ſell at about 5s. a head. Each ſheep has about two pounds of wool, one-fourth of which is very fine; the hatters in Edinburgh have offered four or five ſhillings per pound for it, but it ſells at one ſhilling per pound.* The oldeſt ewes have the fineſt wool, but the coarſeſt is thought fine in Scotland. I have heard that the ſame breed of ſheep may be found in Ireland and Herefordſhire; but little diſtinguiſhed by the fineneſs of their wool.

The number of ſheep may be about ninety thouſand, but might be *increaſed* to four times that number; to point out the means of which was the chief deſign of this eſſay.

The cauſes of decreaſe are many:

1*ſt*. The landholders ſubdivide their lands ſo often for the purpoſe of getting a number of fiſhers, [*N. B.* Six acres is a large farm]—that few tenants are rich enough to purchaſe ſheep, wherefore the maſter gives them ſome in ſteelbow, that is, the tenant keeps them, and the maſter has the half of all the product; but as he never claims the dead, the tenants, urged by hunger and diſpirited by oppreſſion, often *find* ſheep dead by accidents unknown.

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* This ſeems unaccountable.

2dly. The maſter receives part of his rent, and the parſon his tithes in lambs; and the people, to prevent a true account, never gather them from the hills, nor tend them, but mark them and let them run. Some are ſtolen.

3dly. Many fall victims to dogs, eagles, and ravens, in ſpring; and ſome are ſmothered or drowned in winter, by almoſt a total neglect of them by the owners.

4thly. As tenants ſeldom receive money from theſe monopolizing maſters, they are forced to ſell their ſtock privately to purchaſe neceſſaries.

5thly. From a ſhort-ſightedneſs peculiar to this people, they ſeldom look beyond the enjoyments of the day. *Cauſe:* As ſoon as a farmer is thriving, he gets a warning to remove, and muſt buy his peace by a ſum of money proportioned to his circumſtances.

Indeed, premiums have been offered to encourage breeding; but as the landholders diſtribute theſe, no ſhare is allotted to the farmers, who alone have the power of giving effect to theſe deſigns.

Now the means propoſed, I think, would be effectual and profitable to thoſe who ſhould undertake the deſign.

Let any company of clothiers take a ten or twelve year's leaſe of as many ſcattalds (paſture-grounds) as poſſible, with all the ſheep upon them. Let ſome ſhepherds be got from Scotland, (I would not truſt a Zetlander) who know the management of ſheep in ſnowy hills, and who could be truſted with another's property. Let there be wool-ſorters got; and as the Zetlanders are the beſt ſpinners in Britain, let the wool be ſpun, and yarn ſent to England, for veſt-pieces, &c. &c. By this their numbers would increaſe, and the overplus would belong to the company; and it would become beneficial to the iſland in giving employment to the poor, many of whom are now ſtarving for want. Even other branches of trade might be carried on by the ſame company to their own and the country's mutual advantage;—an account of which I will readily give, if ever it be required.

ON THE FINENESS OF WOOL.

For the ſuperior fineneſs of the Zetland wool, there are many conjectures;—but I am of opinion, there are many concurring cauſes, and the moſt of theſe local.

The chief is the peculiar breed of ſheep.

The next, I humbly conceive, to be the nature of the paſture; which, by its proximity to the ſea, is ſtrongly impregnated by ſalt particles, carried up by the winds; becauſe the graſs on head-lands and banks is ſoft and cloſe, different from the inland or meadow graſs and the ſheep are fond of it; and becauſe it is known that a daily ſupply of ſalt is given to the Spaniſh ſheep at the watering-places; and it is thought to contribute to the fine- [illegible] woo[illegible]

Another reaſon is, their *plucking* the wool, or al- [illegible] this may be confirmed by obſerving that the oldeſt ewes have the fineſt wool.

Another great cauſe is, their northern ſituation; for all animals have more hair than in Scotland, as horſes, cows, &c. Cats, rabbits, and otters, have finer fur. And however ridiculous it may appear, even ſwine have *hair* on certain parts of the body.

Now, as all this is probable, an experiment ſimilar to that in Scotland might be made, by fixing upon ſome ſmall iſle or peninſula, on the ſea-coaſt of Wales, Devonſhire, or Cornwall, where the ſheep could be allowed to feed as in Zetland; and by the increaſe conſequent on a proper care, they might multiply to a great number.

Or, as in Spain, ſome flocks might be fed in the mountains during ſummer, and in the low-lands in winter; but as this laſt ſeems impracticable, I ſhall only obſerve, that the temperature which the Spaniſh ſheep enjoy, is thought to be the reaſon that the hot climate has not the ſame effect on the ſheep there, as it has in every other hot country.

By means of the former experiment, a gradual improvement, if not a new ſtock, might be introduced.

N. B. Five or ſix ſheep of the Zetland breed may be fed with the food of one Engliſh.

An account of the current trade and probable ſchemes of improvement of Zetland, may be had if neceſſary.

I am, your's, &c.

J. TOMPSON.

Burford-School.

ARTICLE XXX.

On Miſcellaneous Topics of Huſbandry.

TO THE SECRETARY.

SIR,

I Have a pleaſure in communicating to the Bath Society every thing that occurs to me in farming, in hopes that part of it may by them be thought of uſe to the public.

I informed you that I found raw potatoes as nouriſhing for hogs as boiled; the expence and trouble of boiling would be too much to be followed on a large ſcale. The great uncertainty of having a good crop of turnips, made me laſt year plant eight acres with a *plough*, with which I turned them out of the ground in October, and carted them into one end of a barn rather in a wet bad ſtate, as I was in a hurry to ſow wheat in the land, and there was no proſpeſt of dry weather. I think I had 60 or 70 tons, which I could have ſent to Briſtol for about 15s. per ton, and probably have neated about 20s. per ton, if I had ſold them; but I preferred trying the experiment of feeding my ſtock with them, and accordingly I preſerved them with once turning till January, and then began to give them with hay to my fat oxen, working oxen, cows, working

ing horſes, ſaddle horſes, and colts, of all ages, and to my hogs; and they all ate them greedily, and looked much better than uſual; ſo that I think theſe potatoes will yield me, in the ſaving of hay and other food, and in the increaſe of manure, about 20s. per ton, and be always in future a good reſource in caſe of a dry ſummer, a ſcarcity of hay, and failure of my turnip crops. But near great cities, where 40s. per ton may be made of them, and manure brought home from thence, the advantage of my practice will be leſs; and I confeſs I am diſappointed in not being able to get my ſheep to eat much of them, which I have endeavoured to force them to do in this way:—I have folded ſome ſheep and lambs in an old garden where there are ſome laurels, lauruſtini, box, and yews, but very little poor moſſy graſs; and there I have for ſome weeks fed them on mangel-wurzel, roota-baga, or Swediſh turnips, cabbages, potatoes, carrots, parſnips, ivy leaves, and a little hay. They prefer each of thoſe things to potatoes, and eat all the evergreen ſhrubs, except box, which being bitter, they will not taſte it; they eat ſome of the potatoes, and would probably eat more, if they were very hungry, and left a day without other food.

Doctor Anderſon muſt have had wrong ſeed, or he would not have been prejudiced againſt mangel-wurzel, which will yield 30 tons an acre (excluſive of the leaves) of good food, which may be houſed like potatoes; and wheat ſown in the land, which is certainly a great advantage, to avoid the neceſſity of naked or barren ſummer fallows.

I had laſt year about 50 tons an acre of Drumhead cabbages, which will yield great plenty in December, January, and February, and they may be ſucceeded by mangel-wurzel and potatoes, and theſe by roota-baga, and turnip-rooted cabbage, which bear froſt much better than common turnips.

Sheep are ſhy of food they are not uſed to eat, but hunger will bring them to eat moſt things fit for them. They are remarkably fond of *roota-baga*, which are leſs ſpungy and more ſolid and ſweet than the common turnip in April. I have this year kept them very good in the ground till I had a good bite of vetches, clover, and rye-graſs; the leaf is ſmooth like the cabbage tribe, and the ſheep are very fond of them.

When I was writing this, I found in your ſecond volume, p. 262, a letter from Mr. Wimpey, recommending the houſeing of ſheep and lambs in winter, to avoid a kind of wind-colic, which kills a great number of the fatteſt lambs when the nights begin to be cold and froſty. I have for many years ſaved my lambs much better than my neighbours, by houſeing them, and giving them hay after drenching them with tar, butter and garlick, which makes them lax for a day or two. They have a cuſtom in Lancaſhire, of rubbing tar and butter on the ſkins of ſheep, which they call ſalving, to thicken the wool, and preſerve them from the ſcab. I have not heard of this practice in the ſouthern parts of this iſland.

After writing the above, I received your favour of the 21ſt, for which I thank you, and ſhall add a few lines in anſwer to your queries.

I had my *roota-baga* from a principal ſeedſman in London, very good, and have preſerved ſome for ſeed, as I ſhall of thoſe you have been ſo good as to ſend me. I like to try every thing new, and therefore wiſh to have ſome of the mowing cabbage, mentioned by Sir T. Beevor in your laſt volume. My Carolina graſs all died, and I fear it has no merit.

The farming gentlemen in North and South Wales are ſo remote from, that they have no intercourſe with, each other; nor have thoſe of different counties much; they are moſtly divided by hills;

and the ſoil varies ſo much, that each county ſhould have a ſociety for promoting agriculture, and other improvements for their local advantages, in which the general good will neceſſarily be involved. In Breconſhire there has been one above 30 years; we followed them, and I have long been ſurpriſed that there ſhould be a county in the iſland without a fund raiſed by the voluntary ſubſcriptions of the affluent, to promote ſuch objects of public utility as the majority of the ſubſcribers approve; but there is a want of public ſpirit, ſo that improvements go on very ſlowly, though I think much faſter in this than any former age.'

The vale of this county, bordering on the Briſtol channel, far exceeds any other vale in Wales in extent and fertility. We have a very good breed of horſes, cattle, and ſheep, and are improving; but in the north-ſide of the county, there are thouſands of acres of heathy hills, where all animals are nearly in a ſtate of nature. The people live in very narrow valleys, and are moſtly employed in herding their ſmall horſes, cattle, and ſheep, on the hills; to the breed of which they give no attention, as they pay very little for their paſture. Their great difficulty is to preſerve them in winter; they houſe the cattle, but the ſheep are often buried in ſnow many days, and I have known one farmer loſe above 500 lambs in one ſpring, and be ſeveral years breeding a freſh ſtock on the ſame hills, as thoſe brought from other hills would not ſtay on his ſheep-walks, and moſt of his neighbours ſuffered by the ſame cauſe and had none to ſpare. Theſe ſheep yield about one pound of wool each, which is made more hairy by being expoſed to rain and ſnow.

I think that ſmall ſheep, ſhort ſweet paſture, and ſhelter from rain and ſnow, are all eſſential to produce very fine wool; but the ſize of the animals muſt ſuit the richneſs of land, to yield the farmer profit, and that muſt ever be his firſt conſideration. Tithe, and the indolence and infidelity of ſervants, will ever be a great diſcouragement to gentlemen in farming, though I believe there never were ſo many gentlemen farmers as at this time; and that moſt of the modern improvements have been made by them. Let the partial and unjuſt law of tithe be aboliſhed, and an equal pound-rate ſubſtituted; and let all owners of eſtates have a power to grant the terre tenant a leaſe for 21 or even 14 years; and let a general incloſing and road bill be paſſed, without ſacrificing the intereſt of the publick to the emolument of the Speaker of the Houſe of Commons, and his officers; and improvements in this iſland would now go on rapidly, beyond our moſt ſanguine expectations, and inſtead of encouraging the ruinous practice of gambling, by giving King's plates under a pretence of improving the breed of horſes, let the government give a certain ſum (in proportion to the amount of the land-tax in each county) upon condition that double or treble that ſum be raiſed by the inhabitants, and applied to improve agriculture, and other objects of publick utility there, and it would then ſtimulate the gentlemen to meet and exert themſelves, as it would be a diſgrace to loſe the publick bounty, through their own indolence and want of patriotiſm. The national advantages of incloſures, inſtead of wilds and race-grounds, would then ſoon be better attended to and underſtood. There would always be too much land uninclosed on the tops of hills, and ſheep will always be too profitable to be neglected, if it were poſſible to incloſe the more level parts of the whole iſland; ſo that the objection to incloſing on account of ſheep-walks, and alſo on account of the poor, (who are much more wretched for want of work near commons, than where all the land is incloſed,) is futile and ill-founded, for want of a more general and perfect knowledge of facts.

The arable farmer is a very uſeful member of ſociety; he employs twenty times as many people as the grazier, and ten times as many as the dairyman, on a farm of equal value; furniſhes proportionably more of the neceſſaries of life; and often lays out from 5 to 8l. per acre in ploughing, liming, and ſeeding an acre of wheat; and as ſoon as he has cut it the rector* comes and *ſweeps away* one-tenth of his crop, when the remainder is much too little to repay him his expences. Is there any equity, or ſhadow of juſtice in this? Why ſhould this laborious induſtrious man pay five times, and in ſome caſes ten times as much as his neighbour, for having a ſermon preached to him once a week, by an immoral curate, who is often hired by the abſent rector for one-eighth or one-tenth of the value of the living? And what is ſtill more mortifying to the farmer, and derogatory from the original intention is, that eccleſiaſtical corporations and lay impropriators live in luxury, vice, and folly, on the labour and induſtry of the poor arable farmer.

To encourage the plough would be a much more effectual way to reduce the price of corn, and enrich the country, than to reſtrain exportation, and pay a bounty for importing what could be abundantly

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* This is confeſſedly a ſerious diſcouragement to agricultural improvements, and calls aloud for a reformation. The rector, in ſuch caſes, is not to be blamed; he has the law on his ſide, and the farmer cannot expect him to forego his legal right.

dantly ſupplied from the thouſands of acres now lying waſte.

I heartily wiſh the utmoſt ſucceſs to your patriotic ſociety, and all other attempts to promote the publick good.

I am, Sir, your's, &c.

J. FRANKLEN.

Llanmihangle, April 25, 1791.

ARTICLE XXXI.

Extract of a letter from a Gentleman in Scotland concerning the RUTA-BAGA.

"I Have introduced into this country the Ruta-Baga, or Swediſh Turnip, conceiving that it might be of great uſe as an article of green food after the month of March, when uſually our common turnips run all to ſeed, and we find ourſelves at a loſs for food until our graſs grounds are ready; which they ſeldom are until the firſt week of May: hence my experience of this plant is moſtly confined to the ſpring.

"The firſt trial I made was in the year 1789; not knowing better, I followed the common method of ſowing the ſeeds in my garden, upon an hot-bed, ſome time about the 12th or 15th of April; about the 10th of June I tranſplanted them into the field, where I had turnips, carrots, and other drilled crops; the quantity of ground planted was exactly half a Scotch acre. It had been ploughed and dunged in the uſual manner, the ſame as the reſt of the field, where the turnips were ſown and drilled in the ſame way into three feet ridges. About the beginning of July they were horſe-hoed and hand-hoed, and managed exactly the ſame as the turnips. I forgot to mention the plants were ſet nine inches ſeparate in the row, and not one of them failed taking.

“ In winter I began taking up a few for my table; they ſeemed in general ſmaller than our common turnips, and longer, moſtly of the figure and ſize of a quart bottle; but *twice as heavy* as a turnip of the ſame ſize. For their uſe for the table, I can confidently recommend them as of ſuperior flavour, ſo much ſo indeed, that after eating them none of my family would taſte the other turnips.

“ I tried my cows and my fatting oxen with them, and they ate them as readily as the common turnips. My ſheep uniformly refuſed them as long as they could get other turnips; this I did not wonder at, as all my ſheep are ſix and ſeven years old, and their want of teeth makes it difficult for them to eat a root ſo much harder than turnips.

" To try how the Ruta-Baga would keep after being taken up, I had a few pulled in November; one half cart-load I put up in ſand in a barn, and the reſt I laid upon a graſs-walk in my garden, to be ſafe from being eaten up; they lay there entirely expoſed to the weather until April, when they were juſt as good, and the cattle ate them juſt as well, as if thev had been freſh; thoſe in the barn were juſt [illegible]; and we had them both at our own table, and found them quite as good as thoſe we had eaten in November. This trial abundantly convinces me of their hardineſs, as we had in 1789, from the 15th of March thro' all April, very hard and ſevere ſtorms of froſt and ſnow with little or no intermiſſion.

" In 1790, there was no froſt. Imagining this a year that the tranſplanting was troubleſome, and that they might grow larger if ſown on the place where they were to ſtand, I cauſed half an acre to be ſown the firſt week in June, in drills of three feet, and laid out the plants like common turnips; the event anſwered my expectation; the roots were conſiderably larger than laſt year, although ſown on

much

much worſe ground. Except what was uſed for the table, the whole was pulled up the 20th or 25th of March, and laid in heaps in the barn yard, entirely uncovered from the weather, and were given to my fatting oxen after all our common turnips were gone. I think they laſted about three weeks, which was of the greateſt advantage to me, for the mildneſs of the weather cauſed all our turnips to ſeed, and having no graſs, our cattle were ſtarving.

" On the whole, I am already of opinion that the Ruta-Baga is a moſt valuable root; whether it be uſed by taking up a quantity previous to a [illegible] of ſnow, when the other turnips cannot be got at, or by pulling up in ſpring and laid by, to be uſed after our common turnips are gone."

Article XXXII.

On Butter-Making,—and the Author's Pamphlet on Dairying.

TO THE SECRETARY.

Sir,

ABOUT the time I publiſhed the ſecond edition of *Dairying Exemplified*, being ſoon after the death of my good friend Mr. Rack, who was earneſt for the ſucceſs of it, as he thought it had a tendency to great utility; I wrote a letter, directed to the Secretary of the Bath Agriculture Society, mentioning how deſirous Mr. Rack, with whom I had exchanged ſeveral letters on the ſubject, was, for the publiſhing an edition on dairying alone, (my firſt having contained a treatiſe on orchards, and on vegetation) which he thought, as it would come cheaper, would be an inducement to huſbandmen and dairy-women to purchaſe, and apply it. I did expect the Society would have ordered ſome of them, as Mr. Rack aſſured me they highly approved of the work, and deſired him to ſignify the ſame to me; and alſo that they would take care to have them diſperſed as much as lay in their power, for publick benefit. I ſhould have ſent one hundred copies to Mr. Rack, if he had lived till after they were publiſhed. He had at different times ſome dozens of the former edition, which he diſtributed where he thought they would be uſeful. Meſſrs. Wilkes, of Leiceſterſhire, who I expect many of the Society are acquainted with, ordered one hundred of them, and have had ſeveral dozens of the ſecond edition.

Lately reading in the Appendix to the Monthly Review ſome remarks from a publication on the phyſical and chemical properties of milk, tranſlated from the French, I was led to take notice of their experiments touching ſome things related in my ſecond edition, concerning butter, as their remarks in many reſpects confirm the opinion I ventured to publiſh; and this encourages me to give my farther thoughts thereon to the Society, which I wiſh you to communicate to them, as I think all people ſhould render every endeavour in their power to promote publick advantage; and as butter is now become of univerſal conſequence, from its very general uſe, and many juſt complaints are made by dealers in it, of an improper management in the making of it, which cauſes it very ſoon to turn rancid, and often become of a very foul nature when caſked up for trade, and is what I could never meet with any body who could give a rational account of. In my ſecond edition I mentioned it as my opinion, that the cauſe of butter ſoon becoming rancid and foul, was, in general, from heating the milk when ſet up, in order to increaſe the quantity of cream; a method which I underſtand is generally uſed in moſt counties that make butter for wholeſale trade. Thus by heating the oily particles of the cream, it becomes pinguid or greaſy; and it is well known that every fat ſubſtance that is heated will in a ſhort time become rancid or reezey; as *bacon* does, ſo far as the heat gets into it. And it is from known cauſes alone that we can fairly reaſon to effects.

From the publication before remarked, it appears that there is in milk an acid volatile alkaline, and an unctuous particle, beſides other chemical properties; among the reſt, a fixed alkali; a muriatic or briny acid; it is alſo remarked, that the volatile ſubſtance which flies off, and occaſions the particular odour, is peculiar to animal bodies; and although from its volatility it eludes every enquiry into its ſpecifick nature, yet there is reaſon to imagine that it is a conſiſtent part of the milk, and conſequently not deſtitute of utility.

This is the firſt time I ever met with any account of the volatile part of milk; but from which I expect many uſeful obſervations may be made. It is ſuppoſed that churning effectuates a chemical change in the cream; and that the particles of butter cannot be produced by any other method;—that heating cream when on the milk, cauſes the volatile particles to fly off, and ſets the cheeſy particles more at liberty; they are apt to riſe with the cream and incorporate with it, which cauſes the butter in a very little time to become foul and rancid, as I ſuppoſe the cheeſy particles ſoon ſeparate from the butter; which in a ſhort time makes it foul, as it acquires more of the nature of buttermilk; that the cream that riſes without the aid of warmth, while perfectly freſh, will yield the moſt delicate butter, and may be preſerved ſweet for the longeſt time. From the method uſed of heating the milk is produced what is called clouted cream, which I ſuppoſe ſhould be termed *clotted cream*, as the warmth cauſing the cheeſy particles to incorporate with the cream, makes it clot and become more mucid or ſlimy; and if to any conſiderable degree, will diſſolve into a cheeſy or curdy ſubſtance, and appear white and foul, as well as rank and bad taſted, and be affected with a diſſolving quality ſomewhat like to the nature of ſlip curd in cheeſe, which I have deſcribed in my book, as the greateſt evil that attends cheeſe-making, and what has been the leaſt known or conſidered by dairy-women.

The reaſon of offering my opinion to the Society concerning the improvement in making butter, was the hint I mentioned above, concerning the quality of milk; and not having found any thing analagous to it in any author I have met with, regarding butter; and being inclined to urge my opinion that heating cream to make butter is a very improper and hurtful method, and what ought to be diſcouraged as much as poſſible, I imagined it cannot be done ſo well as through a ſociety formed for the improvement of agriculture.

As I publiſhed a large edition of my book, the firſt having gone off very ſoon, I have ſome quantity on hand, and I think it will be of great ſervice to dairying to have them diſperſed. I ſhall not publiſh another edition; as I am convinced that dairy-women and farmers are not people to write for. I think twenty or thirty years hence the work will be better known, and more ſet by.

I am, with due eſteem, your's, &c.

JOSIAH TWAMLEY.

Warwick, July 16, 1791.

ARTICLE XXXIII.

Remarks on planting Incloſures, &c.

In a Letter to a FRIEND.

DEAR SIR,

YOU ſaid the other day, you ſhould ſhortly be concerned in ſome incloſure bills. Will you permit me to ſay a word or two reſpecting the general mode of incloſing? The modern incloſures that I have obſerved, have univerſally been made with white-thorn, an article pretty and neat, that will thrive in moſt ſoils, and ſoon make a fence very deſireable near a dwelling-houſe, being of all live fences moſt readily kept within narrow bounds, and in any form moſt pleaſing to the proprietor; but like all other live fences, will grow hollow at bottom, and from time to time require new making, when its ſuperfluous branches will not repay the labour: moreover it is annually unproductive of any profitable fruit.

The motives for incloſing open fields are obvious, utility and profit; therefore, as ſoon as it is determined to divide the land, the ſecond conſideration is to divide it with materials that will be both profitable and uſeful. I have not the ſmalleſt doubt, but that if all the hedges in England had been originally planted in the moſt profitable manner, they would have for centuries paſt produced, and would continue to produce, beverage, and materials for a ſufficient ſupply of ſpirits, for the inhabitants of the whole kingdom; and likewiſe a ſufficiency of food for fattening all the hogs,* and paying the expences of new making, as often as occaſion requires; and all this without being more injurious to the land than the hedges now in uſe. Will you pardon my pointing out a mode, that I am perſuaded would produce all theſe advantages?

To obtain all theſe benefits, plant at the diſtance of every twelve, ſixteen, or twenty feet, a Spaniſh cheſnut, midway plant a crab, midway between the cheſnut and crab plant a common plumb-ſtock, midway between the ſeveral cheſnuts, plumb, and crab ſtocks, plant a white-thorn; when theſe ſeveral plantations have been made three or four years, and are in a thriving ſtate, about the end of February or March, cut them off with a ſharp knife, about an inch or two from the ground; they will then throw out many ſhoots; keep them well weeded, and let them continue growing until the cheſnut ſhoots are large enough for ſtakes and binders, which will be in about ſix, ſeven, or eight years, according as the ſoil ſuits the plants; when the plants are formed into a hedge, for which there will be a plentiful ſupply of ſteepers, ſtakes, and all the requiſite materials; at the diſtance of every hundred, hundred and fifty, or two hundred feet, or at whatever diſtance fancy leads you, leave a ſtraight handſome ſhoot of the cheſnut, to grow into a tree; if you prefer timber, let it remain, and it will grow into a good timber tree: if fruit, let it be grafted with grafts from the beſt cheſnuts you can obtain; it would be deſirable if you had an opportunity to procure the grafts from Spain; in like manner leave a ſtraight handſome ſhoot of the-crab ſtock, and graft it with an apple; in like manner leave a plumb-ſtock, and graft it with a damſon, or any good bearing plumb; likewiſe leave a handſome ſhoot of the white-thorn, and graft it with a medlar; thus will you have a very productive fruit-garden, that will always continue, as you may perpetually renovate by leaving freſh ſtocks every time the hedge is new made, without any waſte of ground, and a permanent hedge equalled by few, and by none excelled. It is of conſequence, as much as can be, to have the hedge on every ſide belonging to the ſame field; then, when the hedge is new made, the plough, which is the moſt effectual protector, will preſerve the whole fence without any expence; artificial protection is very expenſive, and very uncertain; it is of material conſequence to preſerve a new-made hedge from the bite of cattle, and perhaps nothing is more deſtructive than calves, which will go round a whole field and bite off every freſh ſhoot; aſſes are likewiſe peculiarly deſtructive, as they will not only bite off the freſh ſhoots, but likewiſe peel off the rind, and thereby deſtroy the ſteepers. Howſoever firm and ſtrong a hedge may be, it will nevertheleſs give way to violence, on which account it is neceſſary to have materials at hand to repair any damages that may happen; it is therefore very proper to have in each corner of the field, a ſtock or two of cheſnuts for an occaſional ſupply of ſtakes, and likewiſe a ſtock or two of white-thorn for a ſupply of buſhes; this would be no real loſs of ground, when in tillage, as the plough cannot reach the extremity of the angles; and when in graſs it is beſt to have the angles a little rounded off, for a malicious bullock will frequently, when it gets an underling into a corner, ſeverely gore it, or force it through the hedge; but ſhould it happen that theſe ſupplies are not wanted, the wood of the cheſnut will amply repay the value of the ground. It is neceſſary for every paſture field to have a ſupply of water, therefore if the ſoil is compact enough to hold water, a pond ſhould be dug in the loweſt corner of every field, and the ſides planted in like manner as the hedges, the roots of which will preſerve the banks, and the branches in a great meaſure the water from the exhaling effects of the ſun.

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* Surely not *all*.

The all-bountiful Creator has ſupplied the earth with a great variety of very productive vegetables, many of which require their peculiar ſoil and climate; many others will thrive in a variety of ſoils and climates; many are now growing in the open air in England, that at their firſt introduction were confined to the hot or green-houſe. It ſurely is the duty of man to aim at extending the bleſſings of Providence. I know the farmer will cry, "no, no, "I want no fruit in my hedges; I don't want to "tempt the idle to break down and deſtroy my "fences." Believe me, my dear Sir, it is the cry of ignorance. Were every field ſurrounded with fruit, no one would need to trample over hedges for an handful; and no one would grudge his neighbour or the thirſty traveller a gratification ſo eaſily ſupplied; the farmer would hardly turn his head to look at a perſon gathering a few apples, or picking a handful of plumbs; it is the ſcarcity of the commodity that fills the mind of the farmer with theſe puerile fears.* I know a very ſmall pariſh in the eaſtern part of England, where the fruit in a favourable year brings into the pariſh a thouſand pounds ſterling; a ſum till lately (if not now) equal to the rent of the land; and much of this fruit grows along the hedge-rows, not in hedges planted in the manner herein deſcribed, but from trees planted alongſide the hedges, which are continually extended by freſh plantations every time the hedges are new made. A thouſandth part of a thouſand pounds will repay the expence of repairing many fractured hedges; and twenty or thirty buſhels of fruit per acre would amply repay the injury other crops might poſſibly receive from the trees.

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* A member of the Society who has peruſed this article remarks, that he knows an eſtate in Wales, which a few years ago contained a fine fruitful orchard near the farm-houſe; but on account of the miſerable ſcarcity of orchards, the owner thought himſelf obliged to deſtroy this, to prevent the depredations of his neighbours. Wretched ſtate of a country! where the very ſcarcity of a valuable article muſt occaſion its total annihilation!

Cheſnuts are exceeding fine food for ſwine or other cattle; and beyond all doubt much more nutritious than potatòes. For human food, roaſted cheſnuts are a principal part of the diet of the peaſantry in Italy. Apples, almoſt every one knows how to uſe. If the produce of plumbs and medlars ſhould exceed the conſumption of the neighbouring towns, they would prove ſufficient in all probability [illegible] bringing hogs to that degree of fatneſs neceſſary [illegible] freſh or butcher's pork; if they exceeded that [illegible]on, the juice might be fermented and diſtilled, and would probably yield a ſpirit ſuperior in [illegible] to malt, and perhaps not inferior to French [illegible] West-India rum.

If you have patience to perſevere thus far in reading (I am afraid you will think) an unintereſting letter, let me requeſt you not to charge it to my vanity, but to my zeal in endeavouring to point out ſome improvement in the preſent barren mode of planting, ſo univerſally practiſed in this kingdom. To one productive tree, an hundred, if not a thouſand, barren trees are planted; inſtead of the fir, the larch, the poplar, &c. why not plant the cheſnut,

the

the walnut, or the beech?—all productive trees. I have known a ſingle walnut-tree produce forty buſhels in a year; if no other valuable uſe could be found for them, would not ſwine fatten on them? Would mankind but remove the veil of prejudice from before their eyes, and view with a liberal and expanded mind the wonderful works of the great Creator in the vegetable world, what beauties, what treaſures would they behold! Food and raiment for millions of their brethren, now pining in nakedneſs, in want and miſery!

I am, your's, &c.

E. C.

Bath, Nov. 1791.

P. S. I know a gentleman that lives near Aſhford in Kent, who has a grove of Spaniſh cheſnut-trees that ſupplies him with good fruit ſufficient for his family, and preſents to his friends; and frequently yields a ſurplus that ſells for ſeven or eight pounds; many of the trees contain ſeven or eight tons of timber.

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ARTICLE XXXIV.

On the Culture of Rape as Food for Cattle.

TO THE SECRETARY.

SIR,

I Beg to trouble you with an account of an experiment on Rape treated as cabbage; to which I am encouraged by obſerving in your publication of premiums for laſt year, that your Society wiſhed the experiment made. In hopes that my poor mite may not be unacceptable, I truſt for your kindly receiving this effort of

Your very obedient ſervant,

THOMAS J. RAWSON.

Glaſscaly, Athy, May 1, 1790.

HAVING from repeated ſucceſsful experiments on ſowing Rape on wheat, bere, or barley ſtubble, (ploughed as ſoon as poſſible after reaping the crop) as a ſpring feed for ſheep, determined to try its uſes cultivated as cabbage, on the 28th of April* laſt, I had a plot prepared as for cabbage ſeed, and ſown with rape; the plants came up, were very promiſing, and fit to put out the 20th of June. I had prepared a ſeven-acre field, which had borne potatoes two years, after being well manured with the common clay gravel, and had it then in fine tilth for turnips. As I had no conception that the rape would riſe to ſuch magnitude as to injure the turnips, I marked outfurrows with one furrow of the plough at ten feet aſunder; laid the rape plants at eighteen inches apart againſt the upright ſide of the furrow, and covered the roots by returning the earth which the plough had thrown out with eighteen inch hoes; I then ſowed the whole field with turnip-ſeed by a drilling-machine of twelve inches apart, and buſh-harrowed and rolled in the ſeed without injury to the rape plants. The rape ſucceeded beyond any expectation I could have formed, ſo as to overſhade and injure the turnips for eighteen inches, at either ſide, which in the intermediate ſpaces were a very fine crop; as nearly as I could calculate, two acres of the ſeven were occupied by rape, and the remaining five by turnips; the rape continued to flouriſh until the 1ſt of November, at which time it averaged upwards of twenty pounds per head, (ſeveral came up to forty;) ſuch was the amazing luxuriance of the crop, that I dreaded its not ſtanding the winter; and on the 1ſt day of

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* The 28th of April is too early to ſow the ſeed; about the 7th or 10th of May will be the beſt ſeaſon.

November put two hundred large wethers into an incloſure of thirteen acres of light land, which had been eaten bare, and began to give them the rape; they immediately took to it with eagerneſs, and in three days not a ſheep of the whole but would attack the carter for his breakfaſt; I continued to give it in profuſion without hay or any other food, and it not only kept, but very much puſhed forward the 200 ſheep until the 1ſt of January. I then began with the five acres of turnips, which (with the help of a quantity of hay) did not laſt the ſheep more than ſeven weeks, which evidently ſhews that one acre of rape was equal to three acres of turnips, altho' they were as good a crop as I ever ſaw; and had the rape been planted in three-feet rows (the manner I now purpoſe to treat it) and properly earthed, I have no doubt it would have been, if poſſible, much greater. I kept in a walled yard twenty porkers from the firſt of September to the firſt of January on the under leaves; they as well as poultry of all kinds are exceedingly fond of it. I tried ſome Scotch cabbage, in the ſame ſituation of the rape, but they did not average more than ſeven pounds per head; evidently rape will flouriſh where a cabbage would not exiſt; and drought, which is the bane of cabbage, will not affect it. The numberleſs advantages of introducing rape in addition to turnips and cabbage, (tho' cabbage ought by no means to be haſtily excluded) muſt be evident to every intelligent huſbandman. Two drills, which I left uncut, ſtood the winter remarkably well; ſo that my fears were groundleſs, and I have no doubt but rape will on trial be found to be the moſt profitable vegetable diſcovered, for the *firſt* and *laſt* of a courſe of ſpring-feeding ſheep.

I ſhall beg to add one other remark, which is, that inſtead of my uſual method of ploughing up the ſtubble, and ſowing rape-ſeed as herein firſt mentioned, I am determined to ſow the ſeed in a prepared bed the firſt of July, and when the ſtubble ground is ploughed and harrowed in September, to put in the plants, which I am convinced muſt give a ten-fold crop, and would greatly ſupply the farmer's wants in April following, or *bring an excellent crop of ſeed in Auguſt*.

EXPENCES *of an Acre of* RAPE.	£	*s.*	*d.*
One year's rent - - -	1	5	0
Three ploughings and harrowings -	1	2	6
Three women ſetting the plants -	0	1	6
Two men returning the earth with ſhovels or broad hoes - - -	0	1	6
A boy and cart attending the ſheep 9 weeks, at 12s. per week - - -	5	8	0
Seed not worth charging - -	0	0	0
	£.7	18	6

PRODUCT.

	£.	s.	d.
Supporting 10 porkers 4 months at 2s. per month	4	0	0
Fattening 100 ſheep 9 weeks at 6d. per week, being the loweſt joiſting price -	22	10	0
Mucking 6½ acres of light land, very well worth three pounds per acre - -	19	10	0*
	46	0	0
Deduct	7	18	6
Clear profit beſides the beſt poſſible fallow	38	1	6

* It ſhould ſeem on the whole that this gentleman may have made a profitable experiment; but like moſt others in new experiments, he ſtretches too far in the eſtimate of profit. This article ſeems to be beyond all moderate bounds. The reader therefore will appreciate according to his own judgment.

ARTICLE XXXV.

On Maple Sugar of America.

TO THE SECRETARY.

SIR,

THE Sugar Maple is a natural tree of the woods in the interior parts of North-America, and is very common in particular ſituations, from the latitude of 35 to 45 degrees; it does not grow near the ſea-coaſt, (at leaſt not in the middle or ſouthern ſtates;) but at the diſtance of from 100 to 150 miles directly back from the ſea, it is found more or leſs all through the country, as far as the latitudes I have mentioned, and I believe, to a greater extent both to the northward and ſouthward, and as far to the weſtward as the country has yet been ſettled.

Sugar has been made from the trees for 30 or 40 years paſt; but the country where thoſe trees abound being but thinly ſettled, until very lately, it has not been attended to farther than for a few families, to make ſufficient for their own uſe, and until within theſe three or four years ſcarce any has been made for ſale.

In the ſummer of 1788 I was in America, and made an excurſion into the northweſt parts of Pennſylvania; at the diſtance of about 100 miles from Philadelphia I firſt met with Maple Sugar, and from that time until within about the ſame diſtance at my return, the country people made uſe of no other. My curioſity was excited by finding it ſo ſimilar to the Weſt-India ſugar, and led me to make many enquiries as to the manner of their making it, the quantity of ſap collected from each tree, the weight of ſugar it yielded, and various other particulars reſpecting it. The farmers being moſtly poor people, new ſettlers, and not much accuſtomed to weights or meaſures, differed very materially in their accounts, both as to the quantity of ſap, and the ſugar it yielded, eſpecially as the ſap runs much more freely and in greater quantities ſome ſeaſons than in others. The reſult of my ſeveral enquiries both in thoſe and other parts of the country, led me to conclude, that trees from 18 to 30 inches diameter, which were the ſizes generally tapped, upon the average yielded about forty gallons of ſap, and this quantity about five pounds of ſugar; the ſugar trees frequently growing on their beſt lands, when they wanted the ground cleared, made the farmers indifferent about preſerving them, and the common mode of tapping was by cutting a notch in the tree with an ax, which was enlarged by a freſh cut every year; the ſap was collected in wood troughs made on the ſpot from ſolid logs hollowed out, and the ſap boiled down in the wood in their common pots and kettles, handy to where it was collected. Where the trees were of value, and intended to be preſerved, ſome people tapped them by boring a hole with an auger or gimblet; this was requiſite to be done afreſh every year, or the hole pared larger. The whole of the ſap is collected in ſix or eight weeks, generally beginning to run early in February, and to ceaſe by the laſt of March or early in April: this being a ſeaſon of the year when the farmers have little to do, enables them to pay the greater attention to it, and the expence of manufacturing being little more than their labour, at a ſeaſon when time or labour is of leſs value to them than uſual, makes it a profitable undertaking; and it is ſuppoſed, when the manufactory of pot-aſhes is more generally eſtabliſhed, the aſhes ariſing from the fuel uſed in boiling the ſugar, made into pot-aſhes, will, by increaſing their profits, tend much to increaſe the manufactory of maple ſugar.

It has been ſaid in ſome of the American newſpapers, that there were large tracts of land that produced upon the average fifty ſugar-maple trees per acre; my own obſervation makes me think otherwiſe; though I believe there may be found tracts of 100, perhaps 1000 acres, connected together, that may produce all through from ten to fifteen trees per acre; but to take the general face of the country, for ten miles ſquare, I do not ſuppoſe a tract any where could be found to yield more than five trees to the acre of a ſize fit to be tapped.

On the whole it appears to me that the produce of the ſugar-tree is not of ſufficient value to make it worth cultivation; but that in America, where the tree grows ſpontaneouſly, and where it is found upon large tracts of land that muſt remain for ages before they can be fully cultivated, it is and will be of conſiderable advantage to the inhabitants of the country, and that the making of ſugar from thoſe trees will become more and more an object of conſequence, and be taken up and carried on by people who will make a trade or buſineſs of it, although I do not expect America ever will make ſufficient for their own conſumption; it being an article in ſo general uſe, the expenditure will moſt probably keep pace with the increaſe of inhabitants.

The ſugar-maple tree grows of all ſizes as large as from three feet to three and a half or four feet diameter; and in the northweſt parts of Pennſylvania, are many of them from 80 to 90 feet high. As a confirmation of my being able to form ſome judgment of their height, I ſhall juſt mention, that I had a white pine-tree cut down for the purpoſe of meaſuring its height, and although not more than two feet diameter, it meaſured 146 feet high, ſome others near it were four feet diameter, and appeared to be thirty feet higher. Trees of every ſpecies in that country were higher than I ever noticed them any where elſe.

The bark of the ſugar-maple is different in appearance from that of the common maple, and not unlike the bark of an Engliſh oak; how far, or whether either of them may be in any reſpect ſimilar to the Engliſh maple, I cannot tell. The leaves of the two American maples appear exactly the ſame, and I believe there is no material difference in the wood; they are both of a light colour, ſplit fair and eaſy; and the common maple is uſed by the ſhoemakers for pegs to faſten the heels of ſhoes together, in preference to any other wood. Some common maple boards have lately been brought to this port from New-England.

All trees while young, that grow in a thick wood of large trees, are ſlow in their growth, and it is difficult to tell their age by the lines that each year's growth makes; I ſhould think it probable that few are fit to tap until they are fifty years old, and that the large trees are generally from 2 to 300 years old. The ſugar maple abounds moſt in ſtony ground, in hilly countries, and where the ground is full of ſprings, or ſmall brooks of water; they grow in the greateſt plenty on the lower moiſt grounds, where the ſoil is moſt natural to beech, birch, or aſh; and are mixed with a variety of other trees, though but rarely mixed with oak.

In the northern parts of Pennſylvania there are great quantities of a ſpecies of pine called hemlock; which with beech, birch, ſugar and other maple, aſh, elm, wild cherry, and ſome few others, conſtitute the timber of the country.

When at Philadelphia I was ſeveral times in company with a perſon who had ſettled about 150 families on a tract of land called Oſſego, at the head waters of the Suſquehannah; the place was a wilderneſs in the year 1784, not a ſingle family within many miles of it; I am ſince informed that laſt ſeaſon he collected from thoſe families, his own ſettlers, and brought for ſale, 30 tierces of maple ſugar that weighed from 5 to 6 cwt. each.

I have now done with the ſubject of the ſugar maple; but as I am addreſſing myſelf to a gentleman who muſt feel himſelf much intereſted in the promotion of agriculture, I ſhall juſt mention an article of manure in great uſe in Pennſylvania, that is ſcarcely known as ſuch here. There are many hundred tons of plaiſter of Paris imported yearly into Philadelphia from France and Nova-Scotia; it has generally been ſold by the cargo from ſix to eight dollars per ton weight; it is firſt broken into ſmall pieces by pounding, and then ground between a pair of mill-ſtones to a powder, and uſed in this ſtate unburnt as a manure for graſs and corn land of every kind; it is ſuppoſed one buſhel will go as far as ten buſhels of lime. The priſoners in the gaol of Philadelphia have lately been ſet to work to grind it, in ſmall mills, with a pair of ſtones the ſame as for grinding wheat, but of a ſize to be worked by two or four men; a double advantage has ariſen to the ſtate from this, by putting to hard work ſuch men as were deſerving of it, and by rendering the article cheaper to the farmers, thereby encouraging them to manure their lands. This hint may be of uſe to the community here.

I am, your reſpectful friend,

THOMAS CLIFFORD.

Briſtol, Dec. 13, 1791.

ARTICLE XXXVI.

Obſervations in a Tour into Suffolk and Surry.

TO THE SECRETARY.

SIR,

ACCORDING to my promiſe I ſend you a ſketch of my tours into Suffolk and Surrey. In doing which, I ſhall be the ſhorter, as the Annals of Agriculture contain much of the good and uncommon huſbandry in thoſe counties.

The latter end of March 1788, I viſited Mr. Young at Bradfield-hall, where I ſaw in a large field before his houſe, about three acres of cabbages, very clean and well managed; and in the ſame field, divided by hurdles, turnips, and ſheep feeding on them: one or two cloathed, to improve their wool: on that part of the field where the turnips had been eaten off, the ground was turning up for barley, and three ploughings were intended, as well for that part where the horſe-hoed cabbages were, as for that where the hand-hoed turnips grew.

Mr. Young's courſe of crops, on ſandy loam or gravel, is,

1. To manure for cabbages or turnips.
2. Plough thrice, after either of them, for barley.
3. Clover.
4. Beans.
5. Wheat.

His quantity of manure for an acre of cabbages or turnips, is forty-one horſe-put loads per acre. He lays out his ground on two-rod ridges. On wet loam, upon clay, 9s. per acre, after a moderate ſprinkling of dung, or other manures, he dibbles on one earth on the middle of the flag, nine inches aſunder, two buſhels an acre of the ſmall, black,

1. Horſe-beans;
2. Wheat, with
3. Clover, or other graſſes.

He pays 3s. per buſhel dibbling beans.

Mr. Young carries all his hay and corn in one-horſe puts or carts, with a waggon-like apparatus on the body; and thinks them more commodious than waggons.

His ſheep-fold, for winter, for a hundred ſheep, is littered with wheat-ſtubble daily in rainy weather, or as often as needful. It is partly under cover, where are racks for hay. He ſeldom gives them turnips there; they are put in late in evenings, and out early in mornings, in dry weather. In wet, they have hay always; and turnips only in very ſnowy or ſtormy weather; depending moſtly on hay in the fold.

A farmer would do well to learn of Mr. Young to make more dung than ordinary, and better. He lets his dung-heaps lie dry at bottom, daily throwing upon them the water of the cattle, having ſhoots to carry off the rain from the hanging roofs of his ox-ſtalls, entirely out of the court, without carrying off any of the richneſs of the dung. He has gutters behind his cattle in the ſtalls, which convey their water into reſervoirs made convenient for receiving it, to be thrown upon the dung.

In April, in warm ſhowery weather, he turns over his dung, a boy ſtanding by with a baſket of ſalt, ſtrewing at the rate of one pound of ſalt to a cubical yard of dung. He has alſo a cowl or veſſel on wheels, to remove the refuſe of the houſe (duſt, &c.) to the farm-yard, which affords ſeveral good loads of manure a year.

The weight of his ſmall weighing coop is 1 cwt. 5 lb. The ſteelyard was made on purpoſe. The expence of the machine was 26s. It will weigh an animal, or any thing not exceeding 6 cwt.

When turnips are taken up to clear the ground for Lent-crops, it is uſual about Bury to cut off the tap-roots, and place the turnips on the ground in a dry paſture, ſide by ſide, till wanted. The green is left, and put uppermoſt. But the green is rarely conſiderable in lands well adapted to turnips, as they are in that neighbourhood, in compariſon to what it is in heavy and ſtrong lands, not very ſuitable to turnips; where they are apt to run more to green, and leſs to apple.

I ſhall not readily forget the obliging and agreeable manner in which I was entertained at Bradfield-hall, and its environs. Mr. Young invited many gentlemen farmers, both of the clergy and laity, to his houſe; ſome of whoſe viſits we returned. Their mode of viſiting is ſingularly pleaſant and beneficial to the agriculturiſt; I wiſh it were introduced into this and every other county in the kingdom. They meet early enough before dinner to walk or ride over each other's farm, and point out in a friendly way any deficiency of good management. It is not difficult to imagine what a ſpur this is to good huſbandry, and their farms ſhew it: It is of publick as well as private advantage; contributing at the ſame time to health, pleaſure, and profit.

It is well known, that, about Bury, they plough with two horſes or oxen, abreaſt, without a driver. Both at Rougham, and on the road to Bury in their harneſs, I ſaw the Rev. Mr. Heddington's noble team of oxen, of which, or his turnip or other huſbandry, I ſhall ſay no more than that he has lately given an account of them in the Annals, well deſerving the attention of the farmer.

But, being ſtruck with the greater novelties in the mode of huſbandry of Mr. Mure, of *Great-Saxham*,

Saxham, with whom we paſſed the geater part of two days. I cannot refrain from being ſomewhat more particular with reſpect to it. He fats about 180 black cattle a year; many of them Scotch and Welch, feeding them in ſtalls all the ſummer, by cutting and carrying to them meadow graſs, vetches, &c. In winter he gives them a peck a day of malted beans. He alſo feeds them with

Malted barley;
Potatoes;
Cabbages, and chaff or ſtraw cut;
Turnips, and ſtraw not cut;
Bean-meal and water;
Barley-meal and water;
Dry bean-meal, } and, *then*, they are led to
Dry barley-meal, } water, twice a day.

Mr. Mure has erected a circular building for feeding 46 head of cattle, tied up at 3½ feet aſunder, outſide of the circle, with covered reſervoirs in the centre for depoſiting fodder, in inclement weather more eſpecially. The whole was fitted up at a ſmall expence, being made of the thinnings of his fir plantations, and covered with thatch; the cribs wattled or wreathed. The poſts, to which the cattle are tied, very little above the crib. A gate leads

leads into the central part, where there is a way for carts or waggons to go round within the circle, between the ſtalls and reſervoirs for fodder; he makes the greateſt proviſion for dung I ever ſaw, by his ſtall-feeding all ſummer, cutting and carrying tares, graſs, &c. to his cattle, and bedding them on ſtraw or ſtubble. All the water of his cattle is ſaved, and daily thrown on his dunghills, as well as Mr. YOUNG's.

Mr. MURE plants cabbages earlier than ordinary for food for his cattle. He was planting a field when I was there, which was the laſt week in March, in rows wide enough for horſe-hoeing, at 20 inches aſunder in the rows.

He has a machine for weighing large cattle, which coſt him fifteen guineas, beſides the building to cover it, &c. Alſo a machine for grinding potatoes, worked generally by hand, but may be worked by a horſe; it is a broad nine-inch wheel, turned in and round a wooden frame, in the manner of grinding bark.

Shortly before I was at Saxham, a bet of a rump and dozen had been determined between Mr. Mure and Mr. Macro; the bet was made at a farmer's club, on the queſtion, Whether turnips drilled and horſe-hoed, or ſown broadcaſt and hand-hoed, would produce the beſt crop? Mr. Mure was on the ſide of horſe-hoeing, Mr. Macro in favour of hand-hoeing; and the point was tried on a field of Mr. Mure's prepared for turnips, which was divided for the purpoſe, and the crops put in ſide by ſide, the length of the field, each party taking care of the crop, according to his adopted plan.

After the bet was determined, I had the ſatisfaction to ſee the field of experiment, where the broadcaſt part appeared to the eye as good as the drilled; but I underſtood

	Tons.
The produce of the drilled crop per acre was	14½
Of the broadcaſt - - - -	10
Superiority of the drilled per acre -	4½

Upon which Mr. Macro reſolved ever after to drill and horſe-hoe his turnips, and procured the proper apparatus for that purpoſe; but unluckily did not live long to carry his intention into execution.

Theſe turnips were weighed in what they call in that neighbourhood, ſkippers, (baſkets rather long in ſhape, in which they give turnips, &c. to their cattle,) and it was obſerved that a ſkipper full of the horſe-hoed turnips weighed very conſiderably more than a ſkipper full of the broad-caſt, which ſhewed that the plant had received great nouriſhment, and an improved conſiſtence, from the horſe-hoe, which produced ſo much more weight of turnips than the hand-hoe, in the like ſpace or compaſs, and proved the horſe-hoed crop to be of more value in fact than it appeared to be to the eye, in compariſon with the other.

But now for the prince of farmers, Mr. DUCKITT, of *Eſher-place*. In April [illegible], I viſited his farm, in company with Meſſrs. Young and Macro; but not having time enough then to make all the obſervations I wiſhed, I viſited it again in July following.

Mr. Duckitt's farm is the moſt complete, and kept in the cleaneſt and beſt order, of any I ever ſaw. He ploughs his lands into beds wide enough to contain nine or ten rows of the crop ſown in it, at nine inches aſunder, for the moſt part. His farm at Eſher is about 500 acres, of which nearly 400 are arable. The land is moſtly ſand on a gravel bottom; but ſome of it clayey, and moſt part of it heavy enough for beans, at leaſt for the ſmaller ſort, tick, or horſe-beans.

He drills, on his beds of nine or ten rows,

Wheat,
Barley,
Oats, } at nine inches aſunder.
Rye,
Barley and clover,

Tares or vetches,
Oats and tares,
Rye and tares, } at eleven inches aſunder.
Peas and turnips,

Beans, at eighteen inches aſunder.

After his ground is well prepared by ploughing, he makes five channels or drills with a drill-plough, with as many ſhares and broad-boards; then his dropping-machine follows, and ſheds five rows of ſeeds, which are covered by an harrow.

When the crop is high enough for the purpoſe, he has two horſe-hoes, which hoe five alleys or intervals apiece, and have each a man to hold and guide them. They work one on each ſide of the furrow, which divides the beds, into which the field is thrown; of courſe hoeing at once five rows on each bed, or two half beds. The horſe is led in the furrow by a boy, and by the help of a long whipple-tree draws both the horſe-hoes, which completely hoe the ten alleys. When the land is more than ordinarily dry and hard, two horſes are neceſſary for the work. But wet or dry, no injury is thereby done to the crop, the horſes always going in the furrow. He has ſome horſe-hoes with ſix ſhares, each of courſe hoeing ſix alleys at a time.

On Mr. Duckitt's firſt invention of his horſe-noes, he thought the work would be more regularly and completely effected, if the men who guided the horſe-hoes drew them going backward, between the hoes and the draught, which was certainly placing the men in a dangerous ſituation, in caſe the horſes ſhould become refractory, and uncontroulable by the boy who led them. This was obſerved by the King, who has ſeveral times been pleaſed to honour this farm with a Royal viſit; and his Majeſty very humanely, and with great condeſcenſion, having communicated his idea to a ſon of Mr. Duckitt's, the father, in compliance with his Majeſty's benevolent deſign, has made other horſe-hoes, which are held by men, who go ſafely behind the machines.

But Mr. Duckitt informed me, he did not know which did its work the beſt; and he uſes them promiſcuouſly, as opportunity offers, never leaving undone

done or delaying any horſe-hoeing, to wait for the uſe of either. But ſurely, if thoſe on the latter conſtruction do their work in every reſpect as well as thoſe on the firſt invention, a preference will be given to them, when new ones are wanted; and the Royal and humane idea be encouraged and recorded by future practice, to the honour of the Sovereign, and ſafety of the ſubject.

It is ſcarcely to be imagined how completely Mr. Duckitt makes his wheat-mows. They are finely ſwollen out to that enormous bulk in the middle, tapered up in ſo beautiful a manner to the top, and ſo handſomely covered with thatch, that they are perfect pictures. And the largeſt of thoſe I ſaw muſt have contained many hundred buſhels of corn.

I had the ſatisfaction to find Mr. Duckitt ſowing a field of eleven acres with turnips. It is amazing with what expedition he proceeds; his field was perfectly ploughed and harrowed; and he carried on his work, according to his uſual method when he works with two drill-ploughs, by beginning in the middle of his field. One drill-plough branched off one way towards one ſide-hedge, the other worked oppoſite to it, and tended towards the oppoſite hedge. The drills ſoon worked on faſt enough for the after-work, and were ſollowed by two dropping-machines, going in the tracks made by the drill-ploughs, and there dropping the turnip-ſeeds. After them went a double-zull, or what is there called a ſtrike-furrow plough, to ſtrike up furrows, to throw the work into the beds of ten rows of turnips each, which were dropped at eleven inches aſunder. And then followed two horſes, one on each ſide of the bed, in the furrows, which, by means of a long whipple-tree, as long as the width of the beds, drew three light harrows fixed to the whipple-tree, that covered the whole breadth of the bed, and harrowed the whole as it went on. Each harrow had five rows of tines or teeth, and ſix tines in each row, making ninety in the three harrows; it being neceſſary that the harrows ſhould be cloſe enough only to cover the ſeed, and not to ſink deep enough to diſplace the ſeed, after it falls from the dropping machine.

His drill-plough, after once going, on its return always goes with one ſhare, and ſometimes two in the ſame path it went before, which renders the crops on his whole farm almoſt inconceivably picturesque to the eye.

His barley and all his crops were the beſt I had ſeen; and there are two ſubſtantial reaſons for their being ſo; his ſeed is more regularly placed in the ground at a proper depth, and his horſe-hoeings promote the vegetation of the plant.

Mr. Duckitt's farm implements are the moſt perfect of any I have ſeen. I wiſh I could do them juſtice in deſcribing them. I cannot attempt it; but I muſt take notice, that his carrot-machine has an iron ſhare and cliſp both in one; moves ground nearly two feet below the ſurface, without turning over the ſoil; and would be vaſtly ſerviceable in preparing [illegible] ground for plantations of foreſt trees; for, by means of a trenching-plough, with a ſkim-coulter, going before, and the carrot-machine following in the ſame furrow, the ſoil may be well ploughed and opened to the depth of more than two feet. Theſe implements are moſtly, if not all, of his own invention. It would be a great improvement to agriculture, if they were diſperſed all over the kingdom. Thoſe adapted to preparing the ground, putting in, and cultivating the crop in its growth, would coſt about 30l. I have got what he calls his trenching-plough, with the ſkim-coulter, and his bean horſe-hoe with two ſhares. They coſt me on the ſpot nine guineas and a half, and home eleven pounds thirteen ſhillings.

It may not be improper to explain the ſkim-coulter. It is calculated for lay ground; in its work it precedes the other coulter, turning the flag down, which, by the other coulter following, is ſo completely covered, that the edges do not appear and produce weeds and graſs as in common ploughing. It is fit for turning up lay for a bean crop, for which purpoſe I have uſed it to advantage.

If a little money from the Exchequer, out of the ſame fund which pays the bounty on the growth of flax, &c. could be ſpared, to have complete ſets of theſe inſtruments ſent to the farmers in every county who would make the beſt uſe of them, it would be a good thing. I do not like the gloomy ideas of ſome of my brother farmers, and wiſh they were leſs ſevere on adminiſtration. There is no good in being for ever croaking. If peace ſhould continue, I will not deſpair of ſeeing encouragement given, at proper ſeaſons, to the trueſt and moſt permanent intereſt of the kingdom, by regulations reſpecting tithes, general incloſures, proviſions for the poor, and many other encouragements to agriculture, particularly to ſome ſuch plan as Mr. Duckitt has formed.

His plan, for the improvement of national agriculture, is, " For himſelf, or ſome one under his

" direction, to traverſe the kingdom at the publick
" expence; put in crops, on his principle, on all
" kinds of ſoil; and for due attention to be given,
" at the publick expence, to bring thoſe crops to
" perfection: after which, the farmers may follow
" his plan, or purſue their own at their diſcretion."

Mr. Duckitt himſelf may be now too far advanced in years, and ſettled in buſineſs, to be diſpoſed for ſuch an undertaking in perſon; but has ſons brought up under him, who may be very capable of doing the more active part under his direction.

I ſhall conclude this tedious detail, with an account of a ſingular honour which was ſhewn Mr. Duckitt by the late Marquis of Rockingham, which I think he richly merited, and continues to merit more, by demonſtrating the great benefits that may be given to agriculture, by the horſe-hoe, &c.

The favour I allude to, which the Marquis ſhewed Mr. Duckitt, was preſenting him with a large ſilver cup, of conſiderable value, with the following inſcription on it:

" To William Duckitt, farmer, who by me-
" chanical ſkill, ſagacious obſervation, and diligent
" purſuit,

"purſuit, rendered the principles of TULL practi-
"cable and profitable, and thereby perfected the
"culture of light ſoils, CHARLES Marquis of Rock-
"ingham, as a token of his regard to ſuch publick
"merit, has preſented this cup, in the year 1774.

"*Bonus civis bona agricola!*"

I am, reſpectfully,

Sir, your obedient ſervant,

R. PROCTER ANDERDON.

Henlade, May 16, 1792.

ARTICLE XXXVII.

On the expediency of Sowing Wheat occaſionally in the Spring.

TO THE SECRETARY.

SIR,

WHEAT being the grain of which bread is chiefly made in almoſt all Europe; it well deſerves the moſt diligent care and attention of the farmer. From the very high price it has been ſold at for many years paſt, it ſhould ſeem the produce has not been ſo great in proportion to the conſumption as formerly. Would it not therefore be prudent to promote its cultivation by every means conſiſtent with convenience and general œconomy?

In the enumeration of modern improvements, that of ſowing wheat occaſionally in the ſpring ſhould not be omitted. By *ſpring* wheat ſeems to be meant, by writers on this ſubject, a ſpecies of wheat of a peculiar nature, particularly appropriated to that ſeaſon. Whether there be a real ſpecifick difference between this and the wheat that is in common uſe, or whether it is a diſtinction without a difference—a manœuvre fabricated by the ſingular ingenuity of the times, is more than I am able to ſay at preſent; but I never hear of ſpring wheat at 12s. a buſhel, but Carolina graſs ſeed at two guineas a quart immediately pops into my head; nor can I think of ſuch ſuperlative ingenuity unaccompanied by the idea of a SUITABLE REWARD. Such is the power of aſſociation!

But whether ſpring wheat be a ſpecies totally different from the ſorts in common uſe or not, the farmer need not be ſolicitous about it, for I can aſſure him, that every ſpecies of wheat in common uſe among us, if ſown in February, will produce good plump corn, and be ripe and fit to reap in good ſeaſon, as I have repeatedly experienced ſeveral years paſt. I have ſowed red lammas, white lammas, bearded or cone, and white wheat from America, called by ſome Quebeck wheat, all which ſucceeded equally well. Oct. 28, 1789, I ſowed about nine acres, part of a field of fourteen, with white cone wheat; the remainder of the field was ſo foul and out of tilth, that I determined not to ſow it till ſpring; and not with wheat then, unleſs it could be got into proper tilth. I had it ploughed into very narrow ridges, and in that condition it remained till the 9th day of February, when it was ſown on four-bout ridges, four rows on each ridge. It cut a very poor figure till the month of May, inſomuch that the farmers in the neighbourhood adviſed my man to plough it up and ſow it with barley. From this time it grew away at a great rate, and was in all reſpects as good corn as any that grew upon the farm; and though of a ſpecies that is later in ripening than moſt others, it was not above eight or ten days later than that which was ſown in October in the ſame field.

It is not meant by this to inſinuate, that ſowing wheat in the ſpring is preferable to ſowing it in the autumn. The autumn, *communibus annis*, is on many accounts to be preferred. But I am thoroughly convinced, that when from the unſeaſonableneſs of the weather, the foulneſs of the ground, and not being in proper tilth, it would be imprudent to ſow it, the giving it three or four months fallow at that ſeaſon would give a manifeſt ſuperiority to the crop ſown in February over what might be ſown in November, abſtracted from the conſideration of all injury corn ſown ſo late in the ſeaſon is liable to from froſts, &c. in its young and tender ſtate.

It is true there can be no certain dependance upon ſowing in February. Froſt and ſnow ſo frequently happen in that month as to render ſowing ſometimes impracticable: ſhould it ſo happen, the ſoil will be in an improved condition for beans or oats in March, or ſtill more, if convenient and ſuitable, for peaſe or barley in April. Now, after a winter's fallow of five or ſix months, I am decidedly of opinion, that a crop of either of the articles above-mentioned, even without manure, would be more profitable than a crop of wheat ſown in autumn in ground that was foul and in imperfect tilth, though manured at an expence of ſeveral pounds an acre. It ſhould never be forgot, that it is the net profit, and not the groſs amount, that is the true and only proper object of the farmer's purſuit.

To thoroughly pulverize the ſoil, and keep it clean from weeds, is a maxim the farmer ſhould never loſe ſight of; it is the true *ſine qua non* of ſucceſsful huſbandry. If this be duly performed, and the land planted in proper ſeaſon, ſcarcely any ſoil is ſo poor as not to bear a profitable crop, nor any ſo rich and fertile as to be attended with profit without it. To manure ground that is out of tilth and full of weeds, is to give ſtrength and encouragement to its greateſt enemies, who are perpetually counteracting, and at length defeating the planter's utmoſt endeavours. But let him continue to plough them in till they are in a great meaſure overcome, they will then prove the means of increaſing the fertility which otherwiſe they would have deſtroyed.

I have often ſowed wheat in November, very ſeldom with tolerable ſucceſs, often with bad; I have therefore left off altogether ſowing ſo late in the year; being convinced, from the experience of ſome years, that February is a much better ſeaſon, independent of the benefit accruing from three or four months fallow at that ſeaſon of the year, which indeed I find very great.

Wheat ſowed, I ſuppoſe, the middle of November, ſeldom or never comes up till the latter end of

December; then juſt as it begins to appear, and is in its very tendereſt ſtate, it has two of the ſevereſt months in the year to contend with; when the rigour of the climate generally ſhews its utmoſt ſeverity, and frequently deſtroys great quantities of corn in this its infant and moſt tender ſtate.

I am, Sir, your moſt obliged ſervant,

JOSEPH WIMPEY.

North-Bockhampton, Feb. 28, 1792.

ARTICLE XXXVIII.

On the Culture of POTATOES.

THIS root is of vaſt importance, whether it be conſidered as a food for man or beaſt. Its utility ſeems to be ſo univerſally acknowledged, that every communication reſpecting its culture muſt be well received by the publick.

If the following experiments on a root which cleans and enriches land, at the ſame time that it affords means of keeping a large ſtock of cattle in the winter ſeaſon, ſhould tend to the total excluſion of a ſummer fallow on *light lands*, I ſhall think I have not written in vain, nor will my ſpeculation be altogether uſeleſs.

This root has not till lately been the object of general attention; even the improved counties of Norfolk and Suffolk, a few years ago, knew nothing of it, otherwiſe than as a garden production. In the county of Somerſet, I well remember the time when it was an extraordinary thing for a man to have a field of potatoes; and now, I may ſafely ſay, there are hundreds of acres every year; and to this, poſſibly, the low price of wheat may, *in part*, be attributed. In poor families it is almoſt the whole ſubſiſtence of the children; and a failure of the potatoe is equally alarming with the failure of the wheat crop. Still, there are few counties the inhabitants of which have ſpiritedly entered into the cultivation of this root, on a large ſcale, as a *food for neat cattle, hogs, and ſheep*.

The turnip huſbandry has been conſidered as the *ne plus ultra* of good farming; and that moſt uſeful animal, the ſheep, is almoſt ſolely dependant upon *that* root for winter provender. Is it not therefore worth while to take their *comparative* excellence into conſideration? I would wiſh to engage the attention of my reader, whilſt I draw a fair comparative eſtimate of the expences and produce of a turnip and potatoe crop. I have in neither inſtance, charged *rent*, or any thing for manure, as I conceive their demands in that reſpect equal.

EXPENCES.

TURNIPS.	£.	s.	d.	POTATOES.	£.	s.	d.
	per acre.						
5 ploughings -	0	15	0	2 ploughings -	0	6	0
4 harrowings -	0	4	0	1 harrowing -	0	1	0
Seed - -	0	0	9	Planting - -	1	1	0
Sowing - -	0	0	3	Seed - -	2	0	0
2 hoeings -	0	7	6	Hoeing - -	0	7	6
				Digging up, &c.	2	0	0
		7	6		5	15	0

PRODUCE.

	£.	s.	d.		£.	s.	d.
If a very good crop -	3	0	0	If a very good crop, 100 ſacks at 2s. 6d. per ſack*	12	10	0

Even on the moſt ſuperficial view, the ſuperiority of potatoes is apparent, but when you take into conſideration the certainty of one crop, and the uncertainty of the other, a farmer muſt be an infidel indeed who will not acknowledge it.

Perhaps this might fairly have been put higher.

It is well known that turnips are liable to many accidents. In their infant ſtate, the *fly*, or, perhaps more properly ſpeaking, the *ſlug*, demoliſhes them. If they eſcape this enemy, and get into rough leaf, the black canker attacks them, and leaves, in a few days, a whole field anatomized.

Should they ſurvive all maladies, and come to ever ſo great perfection, a ſevere froſt, or deep ſnow, debars you from making the moſt of them, and after all, it frequently happens, that in the months of February and March, a ſevere froſt following a wet day, deſtroys your whole crop, and deprives you of every reſource, ſave the hay-mow.

Not ſo *potatoes* :—when pitted and well ſecured, they are ſafe from all riſque, (the pilfering hand excepted) and are as good in the months of March and April as in October or November.

To recommend the culture of potatoes on a large ſcale as a food for man would be abſurd; and few farmers would attend to any recommendation of them as a food for cattle, unleſs their value be fairly aſcertained.

To determine this point, I began eight years ſince a courſe of experiments, the reſult of which I now lay before you, hoping that if any error in calculation may have crept into the ſtatements, your readers will attribute it to haſtineſs of writing, and not to a deſign to miſlead.

Many tempting, and I fear exaggerated accounts have been given of the produce and value of potatoes; and in this reſpect, I muſt confeſs myſelf to be in ſome meaſure guilty;—for, by a reference to vol. iii. of your Papers, you will find that I eſtimated their value as a food for hogs, at 4s. per ſack, (240lb.) and I at that time verily thought ſuch a repreſentation to be the fair, unbiaſſed reſult of an experiment honeſtly conducted; but ſubſequent trials have made me alter my opinion; and I ſee the impropriety of drawing certain concluſions from a ſolitary experiment.

Potatoes ſhould not be viewed merely in the light of profit, but as the means of cleanſing the land, and preparing it moſt excellently for a corn crop. There is a great difference between an expenſive fallow, and a profitable fallow crop: the farmer, therefore, ſhould be contented, if they pay the expences of an ample manuring, and keep the land clean.

I have been informed that potatoes have been raiſed to the amount of 1000 buſhels per acre, but my experiments are not ſo flattering; and poſſibly, thoſe great crops were on a *ſmall ſcale*, and from a garden, which might be nearly a maſs of putrid manure.

Such experiments are always fallacious. I have never had a greater produce than a ſack in a perch, or 160 ſacks per acre; though I know it is poſſible to raiſe a greater quantity of ſome ſorts; ſuch as the *Surinam*, the *Ox-noble*, and the *Horſe-legs*; but are theſe potatoes ſo nutritious? I think not.

It may be expected that I ſhould ſay ſomething of the *curl* diſeaſe, to which this root is in ſome degree liable; but I muſt confeſs, that notwithſtanding all my attention for twenty years paſt, during which time I have been in the conſtant habit of planting on a large ſcale, I cannot ſpeak *deciſively* on this ſubject. It ſeems involved in impenetrable myſtery. I have planted from the ſame pit of potatoes on the ſame day, in the ſame ſoil, prepared with the ſame manure; part of the crop has come curled, part not; nay, I have known two ſhoots from the *ſame* ſet, the one curled, the other not. I have raiſed from ſeed, and been careful to gather the ſeed, from the fineſt and moſt flouriſhing plants;

they have been in every reſpect as ſubject to the diſorder as the cuttings of old ſeed. Leſt the *heat* of the pits might be injurious, I have covered them in the place where they grew, and left them *undug* till the time of planting;—all the ſame! I have planted before they ſhoot out, and after;—no difference!

In ſhort; I once planted two tons of potatoes in the month of June, which were more than half rotten, and purchaſed at a trifling ſum of a captain of a Dumfries ſhip, on Briſtol quay, and I never had a much better crop.——What certain concluſions then can be drawn from theſe premiſes—but that, with all our wiſdom, we are perfectly ignorant of ſome of the moſt ſimple operations of nature?

I forgot to ſay, that I have been in the habit of planting *whole* potatoes, *large* cuttings, *ſmall* cuttings—nay, the mere eye of the potatoe only; but I never could ſee any difference in reſpect to the *curl.* If the potatoe was *diſpoſed* to be curled, it proved almoſt equally ſo in all methods; and on the other hand, I never knew a true Dumfries potatoe come curled the *firſt* year; perhaps the *ſecond* year a few would be curled; but beware of the *third*; for be aſſured, let your ſoil or manure be ever ſo good, almoſt all will be *curled* the third year, if planted in the *ſame* ſoil or neighbourhood.

As to the land moſt favourable to this root, there can be little doubt:—A rich ſandy loam is the beſt; but potatoes may be grown to advantage on all ſoils of a *looſe* texture.

The richer the land, the more abundant the crop, which varies from 50 to 150 ſacks, (240lb.) per acre; but let not the farmer confide too much in the ſtrength of his ſoil, to the excluſion of manure; not leſs than twenty cart-loads of which ſhould be put on an acre; by cart-load I mean 30 buſhels. Of all manures, horſe-dung, *well rotted*, is the beſt; next to it, hog's dung; after that, all other ſorts of animal dung.

Lime, marle, chalk, ſoaper's aſhes, and rags, do but little good; and in ſome inſtances do harm, by making the potatoes ſcabby. Green vetches, or clover, covered in by planting, is good manure.

Endeavour, as much as you can, to plant in dry weather, either in the months of April or May. Uſe large ſets; that is, pick out the largeſt and fineſt potatoes for ſeed, and ſlice them in two pieces, from the crown to the root. Notwithſtanding the experiments of your learned and indefatigable correſpondent Dr. ANDERSON ſeem to juſtify him in recommending *whole* potatoes for ſeed, my trials have all led to a contrary concluſion; and I much wiſh, that your regular correſpondents would give their opinion on this ſubject; from ſuch aggregate of information, ſome decided opinion might be formed.

Change your ſeed every *two* years, and go as far from home as you can for a ſupply. In the vicinity of Briſtol, perhaps the *Scotch* ſeed, imported from Dumfries, is the beſt.

Do not cover your ſets in planting with more than three inches depth of earth, and be particularly attentive to the *rooks*, which by their ſagacity of ſmell will find them out, and would make great depredations. After the plants have been up about 3 inches, ſet your hoers to work; but by no means let them be uſed after the plants begin to throw out their ſtrings, and form their bulbs: ſhould any ſcattered weeds ariſe, remove them by hand-work.

If labourers can be got, prefer *digging* to ploughing up; and when you dig, compel your men to thruſt their ſpade under the potatoes, and not dig in perpendicularly; by this means they avoid cutting the roots. Never dig up in wet weather; and as faſt as dug, ſecure them in the following manner: make a trench in a dry part of the field, eight inches deep and four feet wide; ſpread a thin layer of dry ſtraw on the bottom, and againſt the ſides; then throw in your potatoes, and raiſe them to the height of four feet, leaving the top ſhelving in the form of a roof; on the potatoes thus placed, lay a bed of dry ſtraw ſix or eight inches thick, and cover the ſame with mould, dug from the ſides of the pit, and patted on to the thickneſs of a foot; after this, let your thatcher cover it with ſtraw, or the haulm of the potatoe, ſufficient to keep out the rain.

In this way, I have kept many thouſand ſacks through the moſt ſevere winters, without injury.

There are various methods of planting; but it may be right to divide them under two diſtinct heads, viz. the *drill* and the *promiſcuous*. Both theſe may again be ſubdivided; but as it is not my deſign to fatigue my reader, by entering into a diſcuſſion on their reſpective merits, I ſhall only ſay, that my experience leads me to prefer the *promiſcuous* mode; and to plant in beds five feet wide, intervals or alleys three feet, dug and thrown on to the beds, and the ſets one foot apart. In this way let the ſeaſon be ever ſo wet, the potatoes lie dry. You alſo, in hoeing, have acceſs, without treading on them; beſides, being planted ſo cloſe, ſuch a putrid fermentation is created by the thick ſhade of the potatoe, that the ſoil is more meliorated, and weeds more compleatly deſtroyed, than in any other method. Horſe-hoeing cuts the potatoes, and tears the fibres or ſtrings on which the bulbs are formed.

I ſhall now proceed to a detail of my experiments, which comprehend ſeven years trial on a pretty large ſcale, and in various ways of planting, and though many, who have been ſanguine in their ideas reſpecting this root, may be diſappointed at the collective reſult, I can only ſay, that perhaps as much benefit may accrue from recording an unſucceſsful as from the moſt flattering and ſucceſsful experiment.

1784.

EXPERIMENT NO. I. SEVEN ACRES.

Culture, expences, and produce, of a field of ſeven acres, ſoil a gravelly loam, on a bed of limeſtone rock, value about 8s. per acre. This field was, in 1783, part of the foreſt of Mendip, and was in its *unincloſed* ſtate worth about 3s. 6d. per acre.

EXPENCES.

EXPENCES.

	£.	s.	d.
Cutting furze and levelling inequalities, 5s. per acre - - -	1	15	0
1783, *October.*			
Ploughing firſt time, 12s. per acre -	4	4	0
1784, *March.*			
Croſs ploughing, 10s. per acre - -	3	10	0
April.			
Dragging with heavy and long-tined drag, 6s.	2	2	0
140 quarters of lime, 1s. 4d. per quarter -	9	6	8
Carriage of ditto, 6d. per quarter -	3	10	0
May.			
Spreading lime, 9d. per acre - -	0	5	3
Harrowing in lime, 1s. per acre - -	0	7	0
Third ploughing, 3s. - -	1	1	0
Harrowing, 1s. - - -	0	7	0
Planting in beds 8 feet wide, alleys 4 feet -	6	6	0
49 ſacks (240lb. each) Scotch ſeed, 6s. per ſack	14	14	0
[N. B. Sets a foot apart.]			
Cutting ſets at 3d. per ſack - -	0	12	3
June.			
Keeping off birds - - -	0	6	0
Hoeing, (beer included) 5s. - -	1	15	0
July.			
Earthing up plants with the looſe earth of the alleys, 5s. - - -	1	15	0
October and *November.*			
Digging up and ſecuring, 40s. per acre	14	0	0
Rent (no tithe) - - -	2	16	0
Intereſt of capital, 5s. per acre - -	1	15	0
Total coſt	£.70	7	2

PRODUCE.

PRODUCE.

	£.	s.	d.
Five hundred and five ſacks, prime coſt, 2s. 10d. per ſack or thereabouts - -	£71	10	10

OBSERVATIONS.

Many of my readers will, I doubt not, be ſurprized at the heavy expence of this crop, and yet even with my preſent experience, I can ſee but *one* extravagant charge, and that is, digging out; this amounts to 5d. per ſack, allowing near 4l. for pitting and ſecuring; perhaps it ſhould have coſt no more than 4d. per ſack.

As to the quantity of ſeed, which may ſurprize ſome, I muſt notice that planting *large* ſets requires a much greater quantity of ſeed than when *ſmall* ſets are uſed.

The charge of intereſt on capital I have long adopted, and I think it right; as to the quantum, it is fixed on the following principles. One hundred acres of land, ſuppoſing them to be worth on an average 20s. per acre, require 500l. capital; conſequently the intereſt at 5 per cent. amounts to 5s. per acre.

After all, however, here is a rough piece of land, which in its unincloſed ſtate, was worth only 3s. an acre, brought by *one* crop unto ſuch a ſtate of pulverization and amendment, as to be worth 15s. and all the expences paid, ſuppoſing the potatoes to be worth 2s. 10d. per ſack.

This field was ſown with wheat, but the time of ſowing was inevitably protracted to a late ſeaſon. In a cold climate, and on a *light* ſoil, never ſow *wheat* after potatoes, but ridge up your land, and leave it for a ſpring crop, and perhaps on *any* ſoil it is good huſbandry ſo to do.

1785.

EXPERIMENT NO. II.— 8 ACRES.
III.—12
IV.—12
———
32 acres.

NO. 2, EIGHT ACRES,

Soil a gravelly loam worth 20s. per acre, had been laid down with ſainſoin 3 years before, which did not ſucceed. This field was marked out into beds, 8 feet wide, leaving 4 feet interval to cover with. Farm-yard dung, 20 cart-loads to an acre, was then ſpread equally on the beds, and the ſets placed thereon at the diſtance of one foot. The interval or alley was then dug to cover the ſets, turning the graſs downwards, or turf to turf. This is called by ſome the lazy-bed method.

EXPENCES.

	£.	s.	d.
1785, *April.*			
Setting at 1l. 11s. 6d. per acre	12	12	0
Liquor	1	11	6
Seed, 7 ſacks to an acre, 5s. 6d.	15	8	0
Manure at 3s. per load (carriage included)	24	0	0
Cutting ſets at 3d. per ſack	0	14	0
May.			
Hoeing, 5s. per acre	2	0	0
Earthing up and ſhovelling alleys	2	0	0
July.			
Hand-weeding, 2s. 6d.	1	0	0
October.			
Digging and ſecuring	14	3	0
Rent and tithe, 25s.	10	0	0
Fences and highway, 6d. per acre	0	4	0
Intereſt	2	0	0
	85	12	6

PRODUCE.

564 ſacks, prime coſt 3s. per ſack.

NO. III. TWELVE ACRES,

Same ſoil as the foregoing;—was in oats 1784; the ſtubble ploughed immediately after harveſt. In March 1785, it was croſs-ploughed, and well harrowed; lines were then drawn longitudinally, with a double-breaſted plough, at the diſtance of four feet, and in this furrow farm-yard dung was ſtrewed, after the rate of 12 loads per acre; on this the ſets were put, at the diſtance of 9 inches, and then covered with a light plough. After the potatoes were about ſix inches high, a furrow was turned from *one ſide* of the plants, and in a week after, another furrow from the *other* ſide. They were then hand-hoed between the plants, after which the earth on the interval was returned to the plant, by the double-breaſted plough. They were after this hand-hoed lightly. Great attention was neceſſary to keep off the rooks, both after planting, and after the bulbs were formed; for the wide intervals, and the elevation of the ſoil on which the potatoes grew, gave them an opportunity of free acceſs, and I verily believe, had they not been narrowly watched, they would have totally deſtroyed the crop. As it was, they did a great deal of damage. Previous to digging out, a furrow was turned in the middle of the interval, ſo that the diggers had only a narrow ſlip of earth to turn over.

EXPENCES.

	£.	s.	d.
1784, *October.*			
Firſt ploughing oat-ſtubble, 3s. - -	1	16	0
1785, *March.*			
Croſs ditto, 3s. per acre - -	1	16	0
Harrowing, 1s. - - -	0	12	0
April.			
Marking out furrows - -	0	5	0
Carried over	£.4	9	0

	£.	s.	d.
Brought forward	4	9	0
Manure, 3s. per load	21	12	0
May.			
Spreading manure, planting, &c. 15s. per acre	9	0	0
Seed and cutting, 5 ſacks to an acre	21	12	0
June.			
Horſe-hoeing, 3s. per acre	1	16	0
Two hand-hoeings, 5s. per ditto	3	0	0
Keeping-off birds	1	4	0
October.			
Turning furrow for potatoes	0	6	0
Digging up and ſecuring	14	11	0
Rent and tithe, 25s. per acre	15	0	0
Fences and highways, 6d. per ditto	0	6	0
Intereſt, 5s. per ditto	3	0	0
	£.95	16	6

PRODUCE.

621 ſacks, prime coſt, 3s. 1d. per ſack.

Part of this field was planted with my own ſeed, and part with Scotch ſeed, then imported. The *latter*, the beſt crop by nearly one-third.

N. B. Should any of my readers think that the price of ploughing is too low, I would inform him, that my ploughing is all performed with the double-furrow plough, with which my man can with eaſe turn 2½ acres in eight hours with four oxen. I have known him plough 20 acres of land, four inches deep, and nine inches wide, in ſix days. This may appear incredible to ſome, but it is nevertheleſs true, and can be done again if required.

NO. IV. TWELVE ACRES.

Soil the ſame as the laſt. Quality of land the ſame; preceding crop and cultivation before planting the ſame. A furrow was then turned about 3 inches deep with a light plough, from north to ſouth; and the manure being brought, and depoſited in ſmall heaps, at a little diſtance, the planters (women) began by putting down the ſets at about twelve inches diſtance in the furrow, and then covered them with a ſprinkling of dung.

The men then followed, and, at the diſtance of 18 inches from the ploughed furrow, dug a trench of the ſame depth, parallel thereunto, and depoſited the contents thereof on the potatoes planted. In this *dug* trench another woman and man proceeded in the ſame way, ſo that the potatoes were ſet in rows 18 inches apart, and one foot from plant to plant.

The ſame ſeed, and the ſame quantity of manure, were made uſe of in the preceding experiment. In the beginning of June, they were carefully hand-hoed at 6s. per acre. After this no other attention was neceſſary, as the plants grew ſo thick, and ſo entirely covered the land, as to ſmother all weeds. When the ſoil is good, and plenty of manure can be afforded, this is an excellent method; the earth is not poached by tread of horſes, and by digging is depoſited ſo *lightly* on the potatoes, that the roots are not checked in their extenſion. I do not approve of very wide intervals, either in corn, pulſe, or roots; and perhaps the drilling of corn, which ſeems to be the rage of the day, will be but a ſhort-lived practice. I could ſtate many objections to it, ariſing from my own experience; but I do not from this infer that it is not an eligible plan on *very poor ſoils*, which want ſummer hoeings to enable them to bring their crops to perfection.

EXPENCES.

	£.	s.	d.
Firſt and ſecond ploughings and harrowing, as in preceding experiment - -	4	4	0
Manure - - - -	21	12	0
1785, *May.*			
Planting, 18s. per acre - -	10	16	0
Seed, 96 ſacks, at 6s. per ſack - -	28	16	0
June.			
Hand-hoeing, 6s. per acre -	3	12	0
Keeping off birds (rooks) - -	0	9	0
Carried over	£.69	9	0

October.	*£.*	*s.*	*d.*
Brought forward	69	9	0
Ploughing out, 20s. per acre - -	12	0	0
Carriage, pitting and ſecuring - -	6	0	0
Rent, &c. as before - - -	18	6	0
	£.105	15	0

PRODUCE.

968 ſacks, prime coſt 2s. 2d. per ſack.

OBSERVATIONS.

In this experiment, I endeavoured, as much as poſſibly I could, to aſcertain the comparative preference due to ploughing or digging out, and I found that a plough with two horſes, a man, a boy, eight women to pick up, and two men to carry to the waggons, could clear but little more than half an acre a day. The expence cannot therefore be calculated at leſs than 20s. per acre.

Theſe potatoes I could have had dug and carried to the pits (if in the ſame field) at four-pence per ſack, or 1l. 6s. 8d. per acre. Now the ſaving of a few ſhillings per acre is no compenſation for the quantity bruiſed by the tread of horſes, the number left in the ground, let the pickers be ever ſo careful—and the want of pulverization, in compariſon with digging:—beſides, ſcarce any mode of planting could have been ſelected for plough-work ſo favourable as this. Had the potatoes been planted on ridges, with intervals, the digging might have been performed at leſs expence than the ploughing. From this and many other trials, I am inclined to give the preference to digging up, and in all caſes where labourers can be procured.

1786.

EXPERIMENT NO. V.—FIFTY ACRES.

Soil, woodcock loam, 18s. per acre;—theſe were two fields of a four-years old ley, and moſſy; they were ploughed in November, croſs-plough'd in March, then harrowed and planted in May, in beds five feet wide, alleys 3 feet.

EXPENCES.

1785, *November.*	£.	s.	d.
Ploughing at 5s. per acre	12	10	0
1786, *March.*			
Ditto, 5s. ditto	12	10	0
Harrowing, 2s. ditto	5	0	0
April.			
500 quarters of lime, at 1s. 10d. delivered	45	16	0
600 loads of dung, 3s. per load	90	0	0
Seed (part Scotch) 400 ſacks, 7s. per ſack	140	0	0
Cutting ſeed and planting, 19s. per acre	47	18	0
Keeping off rooks	1	19	0
Hoeing with a ſpade, called ſpiddling	27	0	0
Digging-up and ſecuring	81	0	0
Rent and tithe	50	0	0
Carried over	£.513	13	0

	£.	s.	d.
Brought up	513	13	0
Fences and highways -	1	5	0
Intereſt of capital - - -	12	10	0
	£.527	8	0

PRODUCE.

3850 ſacks, prime coſt 2s. 9d. per ſack.

OBSERVATIONS.

Half of the foregoing 50 acres was ſown with wheat in the beginning of November, the other half was ridged up, and left for a ſpring crop, and was accordingly ſown with white oats in April; the reſult of which was, that the crop of oats was uncommonly fine, and the wheat very indifferent, having been deſtroyed by the grub or earth-worm in the winter.

This reſult has been confirmed by many experiments; therefore, on a light ſoil, avoid ſowing wheat; and rely on it, that an oat crop in ſuch caſes will turn out of more value than a wheat crop; beſides, you proceed in a better courſe of cropping, and this is of eſſential importance.

1785.

EXPERIMENT NO. VI.— 8 ACRES.
VII.— 2
VIII.—50

60 acres.

NO. VI. EIGHT ACRES,

Of a kind of black earth, approaching to peat, and under it, at the depth of four inches, a ſtrong white clay.

This kind of ſoil is as light as chaff, and will not bring any kind of corn (buck-wheat excepted) to perfection. I had limed it, and ſown it with oats in 1786, but they all withered away before they came out into ear, though at their firſt coming up they looked beautifully flouriſhing.

After fallowing this field, I planted it in ridges five feet wide, and alleys three feet. In digging the intervals or alleys to cover the ſets, I made the men dig deep, and bring up two or three inches of the clay. After hoeing, they were earthed up with two or three inches more of the clay, ſo that the beds were elevated at leaſt a foot above the alleys. When they were dug out, I gave the men 5s. per acre extra to dig the beds down to the level of the alleys; by theſe means a large portion of clay was intimately mixed with the light ſpungy ſurface.

This entirely remedied the defect in the ſoil, and the field produced the ſubſequent year a very good crop of oats, and from that time has been worth 20s. per acre.

EXPENCES.

1786, *November.*	£.	s.	d.
Ploughing oat-ſtubble, 3s. per acre	1	4	0
1787, *April.*			
Croſs-ploughing, 3s. per acre	1	4	0
Harrowing, 2s. per ditto	0	16	0
Lime put on laſt year, and no crop	14	8	0
Planting at 25s. per acre	10	0	0
Seed 64 ſacks, at 6s. per ſack	19	4	0
Cutting ſets, 3d. per ſack	0	16	0
June.			
Hoeing, 4s. per acre	1	12	0
July.			
Earthing up, 10s. per acre	4	0	0
Bird keeping	0	6	0
November.			
Digging out and ſecuring, 35s. per acre	14	0	0
Rent	4	0	0
Fences, &c.	0	4	0
Intereſt of capital	2	0	0
	£.73	14	0

PRODUCE.

564 ſacks, prime coſt 2s. 8d. per ſack.

NO. VII. TWO ACRES.

This land was part of the foreſt of Mendip, and a portion of my allotment on the diviſion of the common belonging to the pariſh of Shepton-

Mallet. This was valued by the commiſſioners at 2s. 6d. per acre. In the month of March I ſet fire to the furze; after which the field was marked out in beds eight feet wide, allowing intervals of four feet for the alleys. On theſe beds hog's-dung was ſpread, after the rate of 30 cart-loads per acre. On the dung the ſets were depoſited, 18 inches by 9.

The rough ſurface of the intervals or alleys was then ſkimm'd off, and placed between the ſets; after which a ſpit of mould was dug to cover with, leaving the looſe earth or crumbs to be ſhovelled in after the potatoes were up.

The produce of this field being well ſecured, was kept to the following May, and then all ſold at the price of 9s. per ſack. This exhibits a remarkable inſtance of the value of a potatoe crop in ſome circumſtances. The produce amounted to forty times the value of the land in fee.

EXPENCES.

1787, *March.*	£.	s.	d.
Burning furze - - -	0	1	0
April.			
Planting, 35s. per acre - -	3	10	0
Dung, 3s. per load - -	9	0	0
Scotch ſeed and cutting - -	6	0	0
Carried over	£.18	11	0

May.	£.	*s.*	*d.*
Brought forward	18	11	0
Hoeing	0	10	0
June.			
Shovelling alleys	0	10	0
November.			
Digging out, 4d. per ſack	3	13	4
Securing	1	0	0
Rent	0	5	0
Fence	0	1	0
Intereſt	0	10	0
	£.25	0	4

PRODUCE.

220 ſacks, prime coſt, 2s. 3d. per ſack.

NO. VIII. FIFTY ACRES,

Of a three-year's old ley, planted in the lazy-bed method.

EXPENCES.

1787, *April.*			
To 1000 loads of dung, at 3s. per load	150	0	0
Planting 8 feet by 4, 30s. per acre, (or 6d. for every 20 yards in length)	75	0	0
Seed and cutting, 400 ſacks, 5s. per ſack	100	0	0
May.			
Hoeing, 5s. per acre	12	10	0
Earthing up, 5s. per ditto	12	10	0
October and *November.*			
Digging out, 6d. per ſcore yards	75	0	0
Securing	4	0	0
Rent and tithe, 25s.	62	10	0
Carried over	£.491	10	0

	£.	s.	d.
Brought forward	491	10	0
Fences and highways - - -	1	5	0
Intereſt of capital - - -	12	10	0
	£.505	5	0

PRODUCE.

3680 ſacks, prime coſt, 2s. 9d. per ſack.

OBSERVATIONS.

Here is a moſt ample and expenſive manuring, and yet the potatoes do not coſt more than 2s. 9d. per ſack.

A crop of turnips would, in ſimilar circumſtances, and in point of total expence, be about 200l. leſs; but were they ever ſo abundant a crop, they would not be worth more than 150l. ſo that a loſs of 150l. would enſue when compared with potatoes, ſuppoſing them worth 2s. 9d. per ſack.

1788.

EXPERIMENTS NO. IX.— 7 ACRES.
X.—80
XI.—10
XII.—20
117 acres.

NO. IX. SEVEN ACRES.

Soil, rich loam. This field was drilled barley in the year 1787; the ſtubble being very clean, it was plough'd after harveſt into 32-feet ridges, that it might be dry in the winter.

In the month of March a furrow was turned between the ridges, after which it was croſs-ploughed and well harrowed. Thirty loads per acre of rotten horſe-dung, mixed with brewers hops, were brought. The planting was performed by digging into beds about 8 feet wide, leaving a vacancy (not dug) of 2 feet for earthing it. The ſets were placed 18 by 12 inches apart.

EXPENCES.

1787, *October.*	£.	s.	d.
Ridging up, 2s. per acre - -	0	14	0
1788, *March.*			
Drawing a furrow, 1s. 6d. per acre -	0	10	6
April.			
Croſs-ploughing, 3s. per acre - -	1	1	0
Harrowing, 1s. 6d. per ditto - -	0	10	6
Planting, at 6d. per ſcore yards - -	14	0	0
Seed (Scotch) 56 ſacks, at 8s. - -	22	8	0
Manure, 200 loads, at 3s. - -	30	0	0
June.			
Hoeing - - -	1	15	0
July.			
Earthing - - -	3	10	0
Carried over	£.74	9	0

	£.	s.	d.
Brought forward	74	9	0
Digging out - - -	14	14	0
Pitting and ſecuring - -	5	4	0
Rent and tithe, 35s. per acre - -	12	5	0
Fencing and highway - -	0	3	6
Intereſt of capital - -	1	15	0
	£.108	10	6

PRODUCE.

1110 ſacks, prime coſt 2s. per ſack.

OBSERVATION.

In this inſtance the expences are very heavy, but ſtill the crop is ſo abundant that they coſt only 2s. per ſack. I conſider this a great produce, being one of the beſt I ever had.

NO. X. EIGHT ACRES.

A conſiderable part of which was in the year 1786 part of the foreſt of Mendip, and was ploughed in the winter, croſs ploughed in May and June 1787, and between that time and October, part of it was limed;—the remaining part was limed in the ſpring of 1788.

Part was planted in rows with the plough, and part on beds by hand. The beds the beſt crop; and as the expence of hand-work does not exceed horſe-work more than 8s. per acre,—the former I think is to be preferred. The part limed in 1787 was better than that limed in 1788.

EXPENCES.

1786-7.	£.	s.	d.
Cutting furze and levelling inequalities -	20	0	0
November and *December.*			
Firſt ploughing, 12s. per acre - -	48	0	0
March.			
Croſs-ploughed half, 12s. per acre	48	0	0
Dragging, 6s. per ditto -	24	0	0
June to *October.*			
800 quarters of lime, carriage, &c. 2s. per quarter	80	0	0
Harrowing 40 acres, 1s. per acre -	2	0	0
Ridging ditto, 3s. per ditto - -	6	0	0
1788, *March* and *April.*			
810 quarters of lime, 2s. per quarter -	81	0	0
Harrowing, 1s. per acre - -	2	0	0
Ploughing 40 acres, 3s. per ditto -	6	0	0
Harrowing down, 2s. per ditto - -	4	0	0
Planting 40 acres, at 18s. per ditto -	36	0	0
Seed, 320 ſacks, 5s. - -	80	0	0
Planting on 40 acres, 10s. - -	20	0	0
Seed, 240 ſacks, 6s. - -	60	0	0
Hoeing the whole, 5s. per acre - -	20	0	0
Digging out and ſecuring - -	130	0	0
Rent (no tithe) - - -	40	0	6
Intereſt of capital - - -	20	0	0
	£.727	0	0

PRODUCE.

4700 ſacks, prime coſt, 3s. 1d. per ſack.

OBSERVATIONS.

OBSERVATIONS.

Though in this experiment, the potatoes appear to come high, yet what other crop would have paid expences ſo large, and in one year, and at the ſame time have left the land in ſo good a ſtate? I do not know a better method of bringing rough land into tillage.

If corn be ſown before the ſward and rubbiſh are a little rotten, the grub generally attacks it, and frequently deſtroys it.

EXP. NO. XI. TEN ACRES.

Soil, a gravelly loam. Part of this field was winter vetches, ſown on a wheat ſtubble, and part ſpring vetches. In the beginning of May the winter vetches were hurdled off, and fed with ſheep, and as faſt as they were conſumed, potatoes were planted in beds five feet wide, and intervals three feet, without any ploughing.

The ſpring vetches were ſown the ſame, and the planting was not finiſhed till the middle of June. As the vetches were put in dear, viz. three buſhels per acre at 6s. per buſhel, (9 gallon meaſure) I have debited the potatoes with the whole year's rent. It is a good way to mow the vetches, and give them to the ſheep in cribs, after withering a little; this will prevent ſufflation—provincially called being blaſted.

EXPENCES.

1788, *May* and *June.*	£.	s.	d.
Planting, 21s. per acre - -	10	10	0
80 ſacks of ſeed, (part Scotch) - -	24	0	0
July.			
Hocing - - - -	2	10	0
Earthing up - - -	2	10	0
October and *November.*			
Digging up and ſecuring - -	20	0	0
Rent and tithe - - -	17	10	0
Fences and highways - -	0	5	0
Intereſt of capital - - -	2	10	0
	£.79	15	0

PRODUCE.

940 ſacks, prime coſt 1s. 8d. per ſack.

In this experiment I could plainly perceive that the ſheep-fold was an excellent manure for potatoes. Even thoſe planted in June produced a good crop. I very ſtrongly recommend this plan. It is compendious. It enables you to keep a large flock, and it is connected with a good courſe of huſbandry —following up the potatoes with a ſpring crop and graſs ſeeds.

NO.

EXP. NO. XII. TWENTY ACRES.

Theſe were taken from the foreſt, and the ſoil for the moſt part, black earth, which is the name given to a ſpecies of land occaſionally found in the foreſt, and which I have before obſerved will not in its natural ſtate bring corn to perfection. Pared in the winter, and burnt in March, April, and May.

EXPENCES.

	£.	s.	d.
1788, *May.*			
Paring and burning, 21s. per acre	21	0	0
140 ſacks of ſeed, 5s. per ſack	35	0	0
Planting, 21s. per acre	21	0	0
July.			
Hoeing, 5s. per acre	5	0	0
Ploughing, digging out, and ſecuring	20	0	0
Rent	5	0	0
Intereſt of capital	5	0	0
	£.112	0	0

PRODUCE.

800 ſacks, prime coſt 2s. 9d. per ſack.

N.B. Allowed 120 ſacks for rotten ones.

OBSERVATION.

In conſequence of a wet autumn and a late ripening, many of the potatoes rotted before they were dug, and many rotted after in the pits. Be careful, therefore, when you plant land of this deſcription, to plant early, and take out early.

1789.

EXPERIMENTS NO. XIII.— 6 ACRES.

XIV.—15

21 acres.

NO. XIII. SIX ACRES, AFTER WHEAT.

Soil, a gravelly loam. Ploughed the wheat ſtubble in October; croſs-ploughed in March, and harrowed it well.

Drilled the potatoes in rows 2 feet apart, and manured with four ton of woollen rags, part of which had been ſoaked in the reſervoir of hog's urine.

EXPENCES.

	£.	s.	d.
1788, *October.*			
Ploughing, 3s. per acre	0	18	0
1789, *March.*			
Croſs-ploughing, 3s. ditto	0	18	0
Harrowing, 2s. ditto	0	12	0
Seed	10	0	0
Forming drills and planting, 15s. per acre	4	10	0
Rags and ſpreading	12	0	0
Hoeing	1	10	0
Ploughing out and ſecuring	4	5	0
Rent and tithe	7	10	0
Carried over	£.42	3	0

	£.	s.	d.
Brought forward	42	3	0
Fences and highway - -	0	3	0
Intereſt of capital - -	1	10	0
	43	16	0

PRODUCE.

245 ſacks, prime coſt 3s. 9d. per ſack.

OBSERVATIONS.

Theſe potatoes came up very curled, which I could not attribute to any defect in the ſeed, as I had ſome of the ſame potatoes planted in another field, which came up well;—from hence, as well as ſome other trials with different crops, ſuch as wheat, flax, &c. I am led to conclude, that rags do not ſuit my ſoil, particularly as I cannot ſee any effect in the field, at this time, and ſurely they muſt now be rotten.

EXP. NO. XIV. FIFTEEN ACRES,

Old ley. This field was planted and managed the ſame as No. 2 in the year 1785.

EXPENCES.

1789, *May.*	£.	s.	d.
Planting, 1l. 11s. 6d. per acre -	23	12	6
Seed, 107 ſacks, at 5s. per ſack -	26	15	0
Cutting ditto - - -	1	6	9
Manure - - -	45	0	0
Carried over	£.96	14	3

June.	Brought up	£.96	14	3
Hoeing, 5s. per acre		3	15	0
Earthing, 5s. per acre		3	15	0
Weeding by hand		1	17	6
Digging and ſecuring		22	10	0
Rent and tithe		18	0	0
Fences and highways		0	7	6
Intereſt of capital		3	15	0
		£.150	14	3

PRODUCE.

1250 ſacks, prime coſt 2s. 5d. per ſack.

1790.

EXPERIMENTS NO. XV.—6 ACRES.
XVI.—8

14 acres.

EXP. NO. XV. SIX ACRES,

Of black earth, ſuch as I have before deſcribed;—this was fallowed and limed in the year 1789, in conjunction with 40 acres of red earth which was then ſown with wheat.

This was left unſown in conſequence of its infertility in reſpect to corn. In the beginning of May it was harrowed merely to make the ſurface a little freſh, and then planted in beds 5 feet by 3 feet. The produce, at 3s. per ſack, amounted to double the value of the wheat crop, though that was ſix ſacks per acre. Labourers becoming very ſcarce in conſequence of the tempting offers of the Briſtol and Bath builders, I was obliged to hire men, at 2s. per day and beer, from a diſtant part of the country to dig them out. Theſe men would not dig by the ſack, and conſequently the expences were enormouſly high. I verily think that my own men, who worked by contract, did as much in one day as the others did in two. In ſhort, manual labour is become ſo dear, and labourers ſo ſcarce, that it is now impoſſible to cultivate this root on a large ſcale;—and I muſt (though reluctantly) be contented with a limited quantity.

EXPENCES.

1789.	£.	s.	d.
Ploughing, liming, &c. 4l. per acre	24	0	0
Planting, 21s. per acre	6	6	0
Seed 46 ſacks	11	10	0
N. B. No hoeing neceſſary.			
Digging out, hauling, and ſecuring	20	3	0
Rent	3	0	0
Intereſt of capital	1	10	0
	£.66	9	0

PRODUCE.

542 ſacks, prime coſt 2s. 6d. per ſack.

EXPERIMENT NO. XVI.—EIGHT ACRES,

Rough wet land. This field was pared at the expence of 12s. per acre; but the ſpring being very wet, it could not be burnt. The potatoes therefore were dug in without any manure, in beds about 8 feet wide, leaving a deep furrow between the beds to let off the moiſture.

The pared turf was laid under the ſets, and then a ſpit dug on them. In the greateſt part of the field I planted *whole* potatoes, and of the magpie ſort, which do better without manure than the white Scotch. In a ſmall part I had the ſets cut in two pieces; and at digging, it appeared to me that the potatoes were larger and of greater weight per acre than thoſe produced by the whole ſets.

EXPENCES.

1790, *March.*	£.	s.	d.
Paring, at 12s. per acre - -	4	16	0
May.			
Planting - - -	14	7	0
Seed, 12 ſacks per acre, 4s. per ſack -	19	4	0
July.			
Hoeing and earthing - - -	2	2	0
Keeping birds off - - -	0	15	8
Digging and ſecuring - -	12	17	11
Rent and tithe - -	6	0	0
Fences, &c. - - -	0	4	0
Intereſt of capital - -	2	0	0
	£.62	6	7

PRODUCE.

365 ſacks, prime coſt 3s. 6d. per ſack.

RECAPITULATION.

EXPER. NO.	EXPENCES.			PRODUCE.		
	Acres.	Per acre. £. s. d.	Total. £. s. d.	Sacks.	s. d.	£. s. d.
1784.						
1	7 fallowed	10 1 0	70 7 2	505 at	2 10	71 10 0
1785.						
2	8 ley	10 14 0	85 12 6	564 —	3 0	84 12 0
3	12 fallow	8 0 0	95 16 0	621 —	3 1	95 14 0
4	12 ditto	8 16 0	105 15 0	968 —	2 2	104 17 0
1786.						
5	50 ditto	10 11 0	527 8 0	3850 —	2 9	528 17 0
1787.						
6	8 ditto	9 4 0	73 14 0	564 —	2 8	75 0 0
7	2 foreſt	12 10 0	25 0 4	220 —	2 3	24 15 0
8	50 ley	10 2 0	505 5 0	3680 —	2 9	506 0 0
1788.						
9	7 fallow	15 10 0	108 10 6	1110 —	2 0	111 0 0
10	80 ditto	9 2 0	727 0 0	4700 —	3 1	724 0 0
11	10 vetches	8 0 0	79 15 0	940 —	1 8	78 6 0
12	20 burnt	5 12 0	112 0 0	800 —	2 9	110 0 0
1789.						
13	6 fallow	7 6 0	43 16 0	245 —	3 9	45 18 9
14	15 ley	10 0 0	150 14 3	1250 —	2 5	151 16 0
1790.						
15	6 fallow	11 0 0	66 9 0	542 —	2 6	67 15 0
16	8 rough	7 16 0	62 6 7	365 —	3 6	63 17 6
	301 acres.		2839 9 4	20924 ſacks		2843 18 3

Average expences per acre 9l. 9s. 3d.

Average produce per acre about 70 ſacks.

Average value per acre, prime coſt about 2s. 9d. per ſack of 240 lb.

EXPERIMENTS

1784-5.

EXPERIMENTS ON FEEDING HOGS.

[It may be neceſſary to premiſe that though in the ſubſequent accounts the expences and conſumption of the hogs are in ſums total; yet the account was taken regularly every month, and it is now brought into groſs ſums, merely to ſhorten the account.]

NO. I. EXPENCES.

1785, *January* 5.	£.	s.	d.
To 12 hogs bought at 25s. each -	15	0	0
April 13.			
To attendance, boiling food, ſerving, &c. 14 weeks - - -	1	15	0
To carriage of pot to boiling-houſe -	0	17	6
To coal, 24 buſhels, at 6d. per buſhel -	0	12	0
To 115 ſacks potatoes, prime coſt 2s. 10d. per ſack	16	5	10
*To 7½ quarters of barley and oatmeal, 22s. 6d. per quarter - - -	8	8	6
To ſtraw, 3½ waggon loads, 10s. per load -	1	15	0
To killing - - -	0	4	0
To hauling to Bath - -	0	12	0
	£.45	9	10

PRODUCE.

1786, *April.*	£.	s.	d.
By 12 hogs ſold to Symes, 146½ ſcore at 7s. per ſcore - - -	51	5	6
By 30 cart-loads of dung, 2s. in place -	3	0	0
	54	5	6
Expences	45	9	10
Profit	£.8	15	8

* Nine gallon meaſure.

OBSERVATIONS.

It appeared by this experiment that hogs would pay 4s. per ſack for potatoes; but certain favourable circumſtances were connected with this trial. The hogs were bought in remarkably cheap; they took to the food with great good-will, and they were all of them what are called proving hogs. I have in many of the ſubſequent experiments bought hogs in no wiſe better than theſe at 35s. or 40s. each. Barley and oats were alſo at a moderate price, at leaſt ſuch as I gave them, which was not of the beſt ſort.

Encouraged however by this experiment, I was induced to enter on a larger ſcale into this mode of applying the potatoe crop. I accordingly built a boiling-houſe and ſties; put up a caſt-iron furnace, capable of holding two hogſheads; a pump; bought ſome old oil-caſks, at 10s. each, to hold the waſh; the coſt of all which amounted to about 70l.

As the houſe proved very convenient, I ſhall deſcribe it. It was of one ſtory, and about 16 feet ſquare, built with ſtone, and covered with tile. In the room below were the furnace, tubs, &c. and the upper room had a large door, opening to a road-way; through this door the potatoes were thrown into the room out of the waggon. In this upper room was a pump, which conveyed water to a large trough, in which the potatoes were waſhed; and from which they were immediately thrown into the furnace beneath. The foul water was let out thro' an aperture in the wall, adjoining the trough. The potatoes were waſhed in a wire ſieve.

By this ſaving of labour, one man could ſerve 90 or 100 hogs. Adjoining the boiling-houſe, were ſties, divided into eight compartments, and capable of lodging 80 or 90 hogs. Into theſe ſties I put 80 ſlips of my own, and 10 old ſows. I alſo divided an ox-ſtall in another part of my farm for the accommodation of a larger lot, to be purchaſed; and having an old brewing-furnace, I put it up at a ſmall expence, being ſanguine in my hopes of ſucceſs; but at my firſt outſet, diſappointment ſtared me in the face—for going to Briſtol to purchaſe hogs, I found them ſo enormouſly dear, that I could ſee no proſpect of their paying any thing. However, I bought 112 as cheap as I could, and after they were home, I weighed them and found that they coſt 6s. per ſcore, live weight. I was in juſtice therefore bound to value my own ſows and ſlips at a high rate.

1785-6.

EXPERIMENT, NO. II.

EXPENCES.

	£.	s.	d.
1785, *December* 3.			
To 10 old ſows, 30s. - -	15	0	0
To 80 ſlips, 6 months old, 25s. -	100	0	0
1786, *January* 31.			
To attendance 8½ weeks - -	3	3	0
To hauling potatoes - -	2	15	0
To potatoes 410 ſacks, prime coſt 2s. 9d. per ſack	56	7	6
To coal 60 buſhels, at 6d. per buſhel -	1	10	0
To buck-wheat, 7 quarters at 25s. per qr. ground	8	15	0
To barley and oatmeal, 18 quarters at 24s. per qr.	21	12	0
To ſtraw, 8 loads, at 10s. - -	4	0	0
To killing 9 ſows - - -	0	4	0
To hauling to Bath - -	0	12	0
	£.213	18	6

PRODUCE.

	£.	s.	d.
1786, *January* 31.			
By 77 porkers ſold at home for -	154	0	0
[Three died.]			
By 9 ſows to Cottle, average 14 ſcore each, at 5s. 6d. per ſcore - - -	34	13	0
[One died.]			
By 70 cart loads of dung, at 2s. per load -	7	0	0
	£.195	13	0

Loſs - £18 5 6

EXPERIMENT NO. III.

EXPENCES.

1785, *December* 27.			
To 112 hogs bought at Briſtol, 40s. per hog	224	0	0
1786, *April* 25.			
To attendance 17 weeks, 12s. per week, ſay	10	0	0
To hauling potatoes	10	0	0
To potatoes, 1244 ſacks, at 2s. 9d. per ſack, prime coſt	171	1	0
To coal, 150 buſhels, at 6d. per buſhel	3	15	0
To barley and oatmeal, 54 quarters, at 24s. per qr.	64	16	0
To tailing wheat-meal, 3 quarters, 40s. per qr.	6	0	0
To ſtraw, 30 loads, 10s. per load	15	0	0
To killing, at 4d. per head	1	16	4
To hauling to Bath, 8 journies	6	0	0
	£.512	8	4

PRODUCE.

1786, *April* 20, 25, *May* 2.			
By 110 ſold, average weight 13 ſcore, 7s. per ſcore	500	10	0
[Two died.]			
By 200 loads of dung, 2s. per load	20	0	0
	£.520	10	0

Profit £.8 1 8.

OBSERVATIONS.

In the courſe of the foregoing experiment many obſervations were made. I found that the water in which the potatoes were boiled was injurious, and therefore avoided mixing it even with the meal. I alſo

I alſo plainly perceived, that the potatoes were better liked when ſlightly boiled, than when boiled to a pulp.

The preference to be given to large hogs was confirmed, for the ſmall growing pigs ate nearly as much food as the large full-grown hogs, and yet they did not appear proportionably to improve either in ſize or fat. I experienced alſo a great amendment in the quality of the waſh, when a quantity of meal was mixed up a week or two before it was uſed. In this way a kind of fermentation is produced, and ſpirit, I preſume, generated. At the commencement of the buſineſs, I found many of the hogs ate the potatoes with reluctance, particularly when given raw, and I invariably found that the quantity of food conſumed increaſed every week, till the animal became three parts fat; after this period they ate but little, and almoſt all they ate turned to fat. It is therefore good policy to make them compleatly fat, and that can only be done by giving time.

Laſtly, I found by this experiment, that farther trials were neceſſary, to juſtify the *ſanguine* ideas I had formed of potatoes, from my firſt experiment.

1786-7.

EXPERIMENT NO. IV.

EXPENCES.

1786, *Nov.* 15, 19, 26.	£.	*s.*	*d.*
To 107 ſlips, my own, valued	103	14	6
To 212 bought at Briſtol, at 5s. 3d. per ſcore, live weight	487	12	0
To attendance on 107, ten weeks	9	9	0
To ditto on 212, eighteen weeks	18	18	0
To hauling potatoes	26	0	0
To potatoes 3097 ſacks, at 2s. 9d. per ſack	425	17	0
To coal, 420 buſhels, at 6d.	10	10	0
To barley and oats, 124 quarters at 24s.	148	16	8
To tailing wheat, 10 quarters at 40s. per qr.	20	0	0
To ſtraw, 70 loads, 10s. per load	35	0	0
To killing 210, at 4d. each	3	10	0
To hauling out	15	0	0
To ſalt given with the potatoes	3	0	0
	£.1307	6	6

PRODUCE.

1788, *January* 15, 20, 26.			
By 104 porkers ſold for 34s. each	176	16	0
[Three died.]			
March 20, 26, 31, *April* 2.			
By 209 hogs, average weight 15 ſcore each, at 7s. per ſcore	1097	5	0
[Three died.]			
By 350 loads of dung, at 2s. per load	35	0	0
	£.1309	1	0

Profit = £.1 14 6.

OBSERVATION.

The large hogs ſtill have the preference; and as far as I can judge, ſalt given with the potatoes is very uſeful. It tempts the hogs to eat them with great avidity. From a few days trial, I am inclined to think that a little malted barley, or oats, mixed in their waſh, would do good; but the ſeverity of the exciſe laws is a great obſtacle to uſeful experiments.

1787-8.

EXPERIMENT, NO. V.

EXPENCES.

	£.	s.	d.
November 2, 4.			
6 ſows and a cut boar (my own) -	12	0	0
66 ſlips, (my own) valued - -	74	0	0
15 bought at Briſtol - -	35	3	6
December 2, 12, 26.			
40 bought at Briſtol - -	83	0	0
65 ditto - - -	143	8	0
92 ditto - - -	155	12	0
January 4, 20.			
166 ſmall hogs - - -	201	0	0
Attendance on 66, eleven weeks -	3	17	0
Carried over	£.708	0	6

	£.	s.	d.
May. Brought forward	708	0	6
Attendance on 384, nineteen weeks -	43	0	0
Hauling potatoes - -	29	0	0
Potatoes, 3760 ſacks, at nearly 2s. 9d. a ſack	517	0	0
Coal, 600 buſhels, at 6d. per buſhel, 9 gallons	15	0	0
Barley and oatmeal, 180 quarters, at 24s. per qr.	216	0	0
Salt - - - -	6	0	0
Straw, 110 loads, at 10s. per load -	55	0	0
Killing 381, at 4d. each - -	6	6	8
Hauling to purchaſers - -	25	0	0
	£.1620	7	2

PRODUCE.

1789, *January* 18, 24.			
61 porkers, at 35s. each - -	106	15	0
[Five died.]			
February 26.			
6 ſows, &c. 73 ſcore, at 5s. 6d. per ſcore	20	1	6
375 ſows, average weight 11 ſcore each, at 6s. 9d. per ſcore - -	1268	15	0
[Three died.]			
680 loads of dung, at 2s. per load -	68	0	0
	£.1463	11	6

Loſs - £.156 15 8.

OBSERVATIONS.

Here was an alarming loſs indeed; but ſome compenſation was made by a conſiderable ſale, this winter, and in the ſpring, of potatoes for the table. The average price of which was about 6s. per ſack: this reduced the loſs on the whole to about 40l. The bad ſucceſs of this year's experiment ſeemed to ariſe from the hogs which were bought being ſmall and very dear. Few large hogs could be procured at any price.

1788-9.

EXPERIMENT, NO. VI.

EXPENCES.

	£.	s.	d.
1788, *October* 6, 8, 15.			
14 ſpay'd ſows, 31s. 6d each -	22	1	0
79 hogs bought at Briſtol - -	143	0	0
243 ditto - - -	492	0	0
1789, *February* 15.			
Attendance, 17 weeks - -	27	0	0
Hauling potatoes - -	36	0	0
Potatoes, 4032 ſacks, at 2s. 8d. prime coſt	537	12	0
Coal, 672 buſhels, at 6d. per buſhel -	16	16	0
Barley, buck-wheat, and oatmeal, 160 quarters	186	13	0
Salt - - - -	7	0	0
Straw, 125 loads - - -	62	10	0
Killing 336, at 4d. each - -	5	12	0
Carriage to Bath and Briſtol -	22	0	0
	£.1558	4	0

PRODUCE.

February 8.

	£.	s.	d.
14 ſpay'd ſows, ſold at 5s. 6d. per ſcore, each ſow 16 ſcore - -	61	12	0

	£.	s.	d.
Brought forward	£.61	12	0
February 8, 16, 22.			
322 hogs, average $14\frac{1}{4}$ ſcore, 6s. 10d. per ſcore	1567	0	0
N. B. None died.			
720 loads of dung, at 2s. per load -			
	£.1700	12	0
Profit £.142 8 0.			

OBSERVATIONS.

The foregoing experiment ſhews, that no kind pays more for the food than ſpay'd ſows. It is true, they are not worth ſo much as other fat hogs, by near 1s. per ſcore, particularly if they are heavy,—but then they get fat quicker, and on leſs food.

In the courſe of this experiment, I tried grinding the potatoes in an old apple-mill, inſtead of boiling, but did not find it anſwer. If room could have been found, to have mixed them with meal, and depoſited them in a reſervoir, ſo as to have fermented, it might have ſucceeded. Having near half of my potatoes left, I reſolved to fat another lot; but as the ſpring was near at hand, I was obliged to purchaſe ſmaller hogs, thinking that large ones would not be ſaleable. The diſpoſition of the buyers ſeemed to be much changed; for though they did not regard a few years ſince how large fat hogs were, yet now they declined purchaſing in the ſpring a higher weight than 10 ſcore per hog.

1788-9.

EXPERIMENT, NO. VII.

EXPENCES.

	£.	s.	d.
1789, *March* 1.			
300 hogs, at 22s. 6d. - -	337	10	0
June 3.			
Attendance 13 weeks - -	20	10	0
Hauling potatoes - - -	20	0	0
Potatoes, 2600 ſacks, at 2s 8d. per ſack -	346	13	0
Coal, 520 buſhels, at 6d. per buſhel -	13	0	0
Barley, buck-wheat, and oat-meal, 120 qrs.	144	0	0
Salt - - - -	4	0	0
Straw, 100 loads, 10s. per load -	50	0	0
Killing 296, at 4d. each - -	4	18	0
Carriage to Bath - -	18	0	0
	£.958	11	8

PRODUCE.

	£.	s.	d.
June.			
296, average weight 7½ ſcore, 7s. 6d. per ſcore	832	10	0
600 loads of dung, at 2s. per load -	60	0	0
	£.892	10	0

Loſs £.66 1 8.

OBSERVATIONS.

The preference to be given to large hogs is, again confirmed. Theſe young pigs were always reſtleſs; it was very difficult to keep them in the ſties; and had they not been carefully ringed, they would have worked up with their noſes all the pitching. They were always covered with filth; for though littered very well, we could not keep them clean. They grew inſtead of getting fat.

1789-90.

EXPERIMENT, NO. VIII.

EXPENCES.

1789, *Nov.* 15.	£.	s.	d.
96 large hogs, at 50s. each - -	240	0	0
1790, *April.*			
Attendance 20 weeks - -	9	0	0
Hauling potatoes - - -	8	0	0
Potatoes, 1220 ſacks, at 2s. 8d. per ſack -	162	13	0
Coal, 320 buſhels, at 6d. per buſhel -	8	0	0
Barley and oatmeal, 90 quarters, 25s. per qr.	112	10	0
Grains, 300 buſhels, 4d. per buſhel -	5	0	0
Salt - - - -	3	0	0
Straw, 30 loads, at 10s. per load -	15	0	0
Killing 96, at 4d. each - -	1	12	0
Carriage - - -	8	0	0
	£.572	15	0

PRODUCE.

PRODUCE.

1790, *April.*

		£.	s.	d.
96 hogs, average weight 17 ſcore each, 7s. a ſcore		571	4	0
200 loads of dung, 2s. per load	-	10	0	0
		£.581	4	0

Profit £.8 9 0.

OBSERVATIONS.

This experiment was conducted with particular accuracy; and from the reſult of it I was led to conclude, that, unleſs circumſtances were particularly favourable, 2s. 8d. per ſack was the utmoſt value of potatoes under the beſt management, in this mode of application.

The hogs were of the Shropſhire ſort, large and fine; and though bought in dear, they alſo ſold out dear. Excepting two or three, they all proved very well.

1790-1.

EXPERIMENT, NO. IX.

		£.	s.	d.
1790, *October.*				
Seven ſows and pigs, 50s. each	-	24	10	0
1791, *April.*				
Attendance 6 months	- -	5	0	0
Carried over		£.29	10	0

	£.	s.	d.
Brought forward	29	10	0
Potatoes, 300 ſacks, at 3s. 6d. per ſack	22	10	0
Barley and oatmeal, 24 quarters	30	0	0
Hauling potatoes	2	10	0
Coal, 70 buſhels, at 6d. per buſhel	1	15	0
Grains, 100 buſhels	1	13	0
Straw, 12 loads	6	0	0
	£.93	18	0

PRODUCE.

1791, *April.*

	£.	s.	d.
Seven ſows, valued, being with young	17	10	0
Forty-two ſlips, 25s. each	52	10	0
[Eight died.]			
Dung, 100 loads, at 2s. per load	10	0	0
	£.80	0	0

Loſs £.13 18 0.

OBSERVATIONS.

I am diſpoſed to think that rearing pigs cannot well be effected without the aſſiſtance of the dairy; and if you do attempt to rear without *that* aſſiſtance, avoid having any litters at the approach of winter. The cold will pinch the young pigs; and if they are once ſtopt in their growth, or as it is vulgarly called *knit*, the beſt keeping *afterwards* will not recover them.

RECAPITULATION.

PROFIT.	£.	s.	d.	LOSS.	£.	s.	d.
1785, Exp. i. -	8	15	8	1786, Exp. i.	18	5	6
1786, —— iii. -	8	1	8	1788, —— v.	156	16	8
1787, —— iv. -	1	14	6	1789, —— vii.	66	1	8
1789, —— vi.	142	8	0	1791, —— ix.	13	18	0
1790, —— viii. -	8	9	0				
	169	8	10		255	0	10
Balance loſt	85	12	0	By balance loſt	85	12	0
	£.255	0	10	By ſundry expences in erecting boiling-houſes, ſties, &c. &c. -	100	0	0
					£.185	12	0

At 2s. 9d. per ſack, this loſs is incurred in feeding hogs for ſeven years.

OBSERVATIONS.

It appears by the preceding accounts that 16,778 ſacks of potatoes have been conſumed by hogs in the ſeven years' experiments, and conſequently (the ſum total raiſed being 20,924 ſacks) that 4146 ſacks have been ſold and planted. Eſtimating theſe therefore, at an average of 4s. per ſack, a profit will remain (after deducting the above loſs, viz. 185l. 12s.) of 73l. 10s. 6d. The reſult, therefore, is, that potatoes are worth, as a food for hogs, ſomething more than 2s. 6d. per ſack of 240lb. weight.

Potatoes will ſhrink in pit between the months November and March, about one ſack in twenty: when pitted, I allow in my calculation of the quantity there depoſited after that proportion.

I am now proceeding in a courſe of experiments to aſcertain the value of potatoes as a food for horſes, cows, fatting oxen, and ſheep; which ſhall in due time be laid before the Society, ſhould they think it worthy their notice.

I am, Gentlemen, your's, &c.

J. BILLINGSLEY.

ASHWICK-GROVE,
July 1, 1792.

END OF VOL VI.

ERRATUM. Page 366, for 32-feet, read *three-feet*.

DIRECTIONS FOR PLACING THE PLATES.

OAK TREES.

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